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THE FOSSIL FORESTS OF ARIZONA

By F. H. KNOWLTON, *United States Geological Survey.**

ISOLATED pieces of fossil wood of greater or less size are of comparative common occurrence and of wide geographical and geological distribution. Not infrequently scattered logs, trunks and roots of petrified trees are brought to light, but only exceptionally are they so massed and aggregated as to be dignified as veritable fossil forests. As examples of such, mention may be made of the celebrated fossil forest of relatively late geological age near Cairo, Egypt, of the huge prostrate trunks near Calistoga, California, of the marvelously preserved upright trunks, also young from the geological standpoint, in the Yellowstone National Park, and, perhaps most remarkable of all, the now well-known fossil forests of Arizona.

The fossil forests are located in the southern part of Apache County, Arizona, and were discovered more than half a century ago, though it was not until the coming of the railroad had made them generally known and easily accessible that they took their place in the scenic interest of that remarkable region which includes the Grand Canyon, the wonderful natural bridges, and the supposed meteoric crater near Canyon Diablo. The forests are now reached from Adamana, a station on the Santa Fe Railroad, and are located to the southward within a distance of less than fifteen miles. The "first forest," so-called, is about 6 miles south of Adamana, the "second forest," 2½ miles beyond the first, the "third forest" some 13 miles southwest of Adamana and the "Rainbow forest" about 2 miles nothwest of the last. There is also a small, but in some respects exceedingly interesting, forest north of the railroad and some 8 or 9 miles northwest of Adamana. This is known as the "North" or "Sigillaria" forest.

The forests south of the railroad and the ones most frequently visited by the tourist, are embraced in the Petrified Forest National Monument, a national reservation created by proclamation of President Roosevelt on June 8, 1906. This Monument at first comprised an area of 90 square miles, but as this was larger than was deemed necessary, it was reduced by proclamation of President Taft in August, 1911, to an area of 40½ square miles. All National Monuments are in charge of the Secretary of Agriculture.

In the "first" and "Rainbow" forests few of the trunks are in the position in which they were entombed, but have been eroded from slightly higher horizons and have rolled in the greatest profusion to the lower levels. As one views these forests from a little distance with their hundreds, even thousands, of segments of logs, it is difficult to realize that they are really turned to stone and now exhumed from the earth. The appearance is not unlike a "log drive" that has been stranded by the receding waters and left until the bark had disappeared and many fallen into partial decay. Trunks of all sizes and lengths are now mingled and scattered about in the wildest confusion, while the surface of the ground

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Photo loaned by Dr. Geo. P. Merrill, U. S. National Museum.

"THE NATURAL BRIDGE," AN AGATIZED LOG, THE ENDS OF WHICH ARE STILL BURIED IN THE ROCK SO THAT THE LOG FORMS A BRIDGE ACROSS A SMALL RAVINE.

Photo loaned by Sante Fe Railroad Company.

BUTT OF VERY LARGE TREE FROM WHICH THE ROOTS HAVE BEEN BROKEN AWAY. JOHN CONNOR, THE MAN SEEN IN THE PICTURE, SAYS "I WAS PROBABLY THE SECOND WHITE MAN TO SEE THE FOREST."

is carpeted with fragments of wood that have been splintered and broken from them.

The "second" and "third" forests have suffered less from the effects of erosion, and, as most of the trunks lie in their original positions, one may here gain a better impression of actual sizes and lengths. One measured by the writer was over 7 feet in diameter and 120 feet in length. The average diameter is perhaps 3 or 4 feet, while the length may vary from 60 or 80 to 100 feet. Under the influence of heat and cold most of the logs have been broken across, the segments, which often lie in proper sequence, ranging in length from a few inches to several or many feet. In some cases a log, perhaps 60 or 80 feet long, has been broken into a series of short pieces with such a degree of regularity and precision of cut that it seems almost impossible to have been accomplished without human agency. They suggest in appearance a log of cedar or spruce cut into the old-time shingle-blocks.

In one notable instance, perhaps the only one of its kind in the world, in the "first" forest a huge trunk now forms a natural bridge. A photograph, kindly loaned by Dr. G. P. Merrill, Curator of Geology in the U. S. National Museum, shows this trunk, which is 4 feet in diameter at the base and 18 inches at the tip and is 111 feet long, now, like the stringer of a man-made bridge, completely spans a gulch some 30 feet across and more than 20 feet deep. As it had begun to crack and show signs of falling, it has been supported by artificial stone piers. In the bottom and along the sides of the little gulch, over which one may cross on the "fossil bridge," may be seen scrubby cedars and straggling cottonwoods, mute witnesses of the striking change since the great forests were living.

In addition to these interesting features, much of the wood, which is now agatized or converted to calcedony, exhibits the most varied and beautiful coloring—"the richest reds, yellows and purples, all heightened by the polish from wind-blown sands, makes each more beautiful than the first." The state of mineralization of much of this wood almost places it among the gems or precious stones.

The wood of the Arizona fossil forests is all completely silicified. "The chemistry of the process of petrification or silicification," says Dr. George P. Merrill, "is not quite clear. Silica is ordinarily looked upon as one of the most insoluble of substances. It is nevertheless readily soluble in alkaline solutions—i. e., solutions containing soda or potash. It is probable that the solutions permeating these buried logs were thus aklaline, and as the logs gradually decayed their organic matter was replaced, molecule by molecule, by silica. The brilliant red and other colors are due to the small amount of iron and manganese deposited together with the silica, and super-oxidized as the trunks are exposed to the air. The most brilliant colors are therefore to be found on the surface."

This process of silicification, anl perhaps subsequent crystalization, was such that in some cases the original form and texture of the wood cells have been greatly distorted or even destroyed entirely, while in other cases it is preserved so that each cell, with its most intimate structured details, is retained with astonishing fidelity. Thin sections of this wood may therefore be studied under the microscope with almost as much satisfaction as could sections from a living tree. Although a complete microscopical examination has not yet been made of all these woods of the region, all from the area south of the railroad that have been examined prove to belong to a single species which has been described by the writer under the name *Araucarioxylon arizonicum*. That is, it is simply the wood of an ancient Araucaria, which, it is well known, does not now live in the northern hemisphere. In this wood the annual or growth rings are not apparent to the naked eye, but under the microscope they are observed to be present, though rather poorly developed and somewhat obscure, the yearly growths being separated by a layer of 2-5 tangentially compressed cells. In radial section the tracheids are observed to be provided with numerous bordered-

Photo loaned by Dr. Geo. P. Merrill, U. S. National Museum.

LOG FRAGMENTS, SOME OF WHICH HAVE ROLLED A SHORT DISTANCE SINCE BEING WASHED OUT OF THE CLAYS. IN THE UPPER LEFT CORNER A LOG IS SEEN STICKING OUT FROM THE CLAYS AND SANDS IN WHICH IT WAS ORIGINALLY BURIED, A PART OF IT ONLY HAVING BEEN UNCOVERED BY EROSION.

Photo loaned by Dr. Geo. P. Merrill, U. S. National Museum.

GROUP OF PETRIFIED LOG SECTIONS. NOTE THE APPROACH TO EQUALITY IN LENGTH OF THE BLOCKS AS THOUGH SAWED FROM A SINGLE TREE WASHED OUT FROM THE CLAYS.

Photo loaned by Dr. Geo. P. Merrill, U. S. National Museum.

"THE TWIN SISTERS." THIS PHOTOGRAPH SHOWS THE TREES BROKEN INTO SECTIONS BUT LYING WHERE THEY WERE BURIED.

pits which are disposed in a single contiguous row, or occasionally in two mutually compressed rows. The medullary rays, as seen in this section, are composed of short, thin-walled cells which in some cases, at least, were provided with small oval pores. In tangential section the rays are found to be in a single vertical series of from 1 to 22 cells.

Several species of trees are present in the fossil forests, as may readily be seen on examining the microscopic sections, but the only other species that has been described comes from the "north" forest, the small forest north of the railroad. It is quite different from the other species, and while undoubtedly araucarian in character, showed so many points of divergence from the living Araucaria, that Dr. E. C. Jeffrey, of Harvard University, by whom it was studied, created for it a new genus. It is known as *Woodworthia arizonica.* It is remarkable in that it was provided with short-shoots which persisted in the wood of the trunk throughout the life of the tree, and now show as pits or scars on the surface. It probably was the presence of twin scars, one on either side of and a little below the principal scar, thus suggesting the lateral cicatricules of the leaf scar of one of the great Paleozoic Lycopods, *Sigillaria,* that led Mr. John Muir to name this forest the "Sigillaria" forest. This name was shown to be entirely erroneous and inapplicable by David White, who reports that no Sigillaria or Lepidodendrons are present in these forests.

As may be presumed from what has already been said, none of the fossil trees now stands upright in the position in which it grew, nor has any been found which retained the branches, though petrified limbs and small twigs are not infrequently associated with them. The evidence seems indisputable that they have all been transported for a greater or less distance by the agency of water. Although the geological formation in which the forests occur is known to cover many hundreds of square miles, and to be characterized throughout by the presence of fossil wood, the exact places where the trees grew are not known. The accumulation of these logs in the masses which now mark the fossil forests suggest floating and stranding of the logs such as may be seen in great eddies or the deltas of rivers. The rocks in which they are now embedded lend support to this view, since they consist of coarse sand and gravel are laid down in fresh water and are conspicuously cross-bedded, an indication of rapid and changing currents.

It may also be of interest to note that the ancient Pueblo Indians, who once inhabited the region including the fossil forests, occasionally built their habitations out of these fossil logs. They sellected such pieces as were of equal size and could be handled by a single man, and these were cemented with clay into a veritable "log house." An engaging fable concerning these Indian houses was widely circulated in American newspapers a few years ago, to the effect that the houses had been built out of then living wood and were subsequently "peetrified"!

Cenozoic	Quaternary Tertiary
Mesozoic	Cretaceous Jurassic *Triassic
Paleozoic	Carboniferous Devonian Silurian Ordovician Cambrian
Proterozoric	Algonkian Archean

The question is very frequently asked: How old are the fossil forests of Arizona? It is, of course, quite impossible to answer this question in terms

Photo loaned by Dr. Geo. P. Merrill, U. S. National Museum.

"THE CANNON."

Photo loaned by the Sante Fe Railway Company.

LOG SHOWING REMOVAL OF THE BARK AND PORTIONS OF THE OUTER WOOD. SOME OF THIS WOOD HAS SPLIT AWAY SINCE THE LOG WAS UNBURIED, BUT THE GREATER PART OF THE LOSS IS DUE TO DECAY BEFORE DEPOSITION OF THE LOG IN THE SEDIMENTS OF THE TRIAS. NONE OF THE LOGS APPEAR TO RETAIN THE BARK.

Photo loaned by Sante Fe Railroad Company.

BUTT OF LARGE LOG SHOWING CONCENTRIC RINGS RESEMBLING ANNUAL GROWTH RINGS, BUT REALLY DUE TO ZONAL SEGREGATION OF MINERAL MATTER.

of years, though the position in the geologic time-scale is easily fixed. The geologic time within which the sedimentary strata were laid down on the earth is divided by geologists into a number of major divisions, each of which—except perhaps the oldest—is characterized by the presence in it of certain plant and animal fossils, and, to a greater or less extent, by the character of the rocks themselves and the conditions under which they are supposed to have been deposited. The names of these major geological units and their sequence is shown in the above diagram.

The Arizona fossil forests flourished in the Triassic period (as indicated by the asterisk above) and were entombed in the minor division, probably in the Upper Triassic known as the Shinarump conglomerate and in the beds immediately overlying. The Triassic, it will be observed, stands not far above the middle of the geologic column, though in the matter of actual thicknesses of deposits it is far above this point. When it is known that since the close of Triassic time probably more than 50,000 feet of sediments have been deposited, it is seen that the age of the Triassic forests of Arizona can only be reckoned in millions of years—just how many it would be mere speculation to attempt to estimate. It is certain, also, that at one time the strata containing these petrified logs were themselves buried beneath thousands of feet of strata of later ages, which have in places been worn away sufficiently to expose the tree-bearing beds. Undoubtedly, other forests as great or greater than those now exposed lie buried beneath the later formations.

Triassic time is usually regarded as a period of widespread aridity, yet there must have been notable exceptions, for it is impossible to suppose that forests with trees 4 to 6 feet or more in diameter and nearly 150 feet in height could have grown without a constant and relatively abundant supply of moisture. The other kinds of vegetation—for there must have been such—that flourished at the same time as these imposing forests is not known, for thus far hardly a trace of plant life other than the woods has been found. In other areas, however, more is known of the contemporaneous vegetation. It is now known that the *Araucarioxylon* lived also in New Mexico, Virginia and North Carolina, and in the eastern areas it was associated with ferns of many kinds—among them tree ferns, horse-tails, cycads and various conifers.

A few years ago the spirit of commercialism came near to ruining the Arizona fossil forests. Before they were set aside as a National Monument and consequently were without an attendant custodian, they were subject to depredation at all hands. Many carloads were shipped away to be cut into table-tops, mantels, paper-weights, knife handles, and other similar objects. Later it was discovered that the wood could be made into emery for the manufacture of sandpaper, and machinery was actually removed to Adamana for this purpose, but fortunately it was not put into operation.

IN BRITISH COLUMBIA.

British Columbia contains no less than one hundred million acres of forest land, containing over three hundred billion feet of timber. The lumber output is about one and a quarter billion feet per year. The annual growth is over five times the present annual cut. Wasteful use, non-use and damage by fire are alike uneconomic. Damage by fire last year $300,000; *about* 160,000 *acres burned over.. The Forest Branch is making a vigorous effort to secure the support of the people in preventing forest fires, from logging engines, brush fires, unextinguished matches and cigar and cigarette ends. Fire protection laws are being vigorously enforced. Lumbermen are being urged to protect the timber through screens on donkey engines, and by establishing around logging operations a complete fire fighting organization. Logging slash is one of the greatest causes of servere forest fires.*

TURPENTINING IN FORESTS UNDER MANAGEMENT

By BARRINGTON MOORE

A GREAT deal has been said about the wasteful methods of the American turpentine or naval stores industry. But when we remember that the forests seemed inexhaustible, this waste was perhaps to be expected. The problem of avoiding this waste engaged the attention of the Forest Service (then the Bureau of Forestry) some years ago. Studies were made in a thoroughly practical manner, to improve existing methods in a way which could be applied by every operator. The first step was to substitute for the wasteful and destructive box a movable receptacle and gutters. This injured the tree less and saved the loss through evaporation caused by the long distance which the resin had to flow to reach the box. The second step, the results of which were published about a year ago in Bulletin 90, "Relation of Light Chipping to the Commercial Yield of Naval Stores," reduced the size of the chip taken off each time the resin ducts were re-opened. This increased the vigor of the tree, the yield of resin per year, and, most important of all, the length of the tapping period. The yied of resin from mature timber or timber soon to be cut was thereby materially raised. One further step is necessary, to devise a method whereby young trees, which under management are not to be cut for 50 to 100 years, may be tapped and yet continue vigorous growth. Such tapping might lower the grade of lumber. But, since a number of species are capable of producing high-grade lumber, while but few can produce turpentine (experiments indicate that western yellow pine—Pinus ponderosa —will yield turpentine commercially) it is not unreasonable to suppose that eventually part of our western yellow pine forests will be devoted to resin production. Furthermore, the discovery that heptane, a solvent used in all chemical laboratories and obtained hitherto only with difficulty, and then not pure, can be secured absolutely pure from the resin of Jeffrey pine, may render the resin of this tree more important than its wood. This will not, of course, affect the timber on Government sales, because the trees to be tapped in this manner will be young and not ready to cut for 40 years or more.

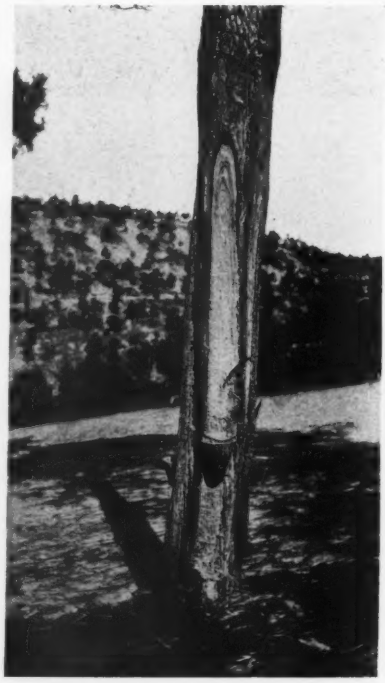
The tapping of young trees can not be accomplished by improvements in a

TREE IN VIRGIN FOREST TAPPED 165 YEARS WITHOUT REST (33 FACES, EACH REPRESENTING 5 YEARS TAPPING) AND STILL VIGOROUS. SHOWS THE BOTTLE-SHAPED BASE CAUSED BY THE HEALED-OVER FACES.

day, or by the wholesale introduction of a foreign method. It will require a period of thorough experimentation. Since the principle involved, elasticity, is best exemplified in the French method, a knowledge of this method is necessary.

The turpentine region of France lies in the dunes and landes of Gascogne, south and east of Bordeaux. The checking and afforestation of these dunes, which were not only unproductive but actually destructive in their advance inland is one of the most enterprising and skillful feats known to forest engineering.

Tapping for turpentine is of two kinds: "gemage a vie," conservative tapping (literally, "tapping for life"); and "gemage a mort," final tapping ("tapping for death"). The first is used throughout the life of the tree after it has reached a certain diameter, the second with trees to be cut within 5 years, and can be as severe as desired, the loss, if the tree is killed, falling only upon the purchaser.



FRENCH METHOD. TREE TAPPED TO DEATH JUST BEFORE CUTTING, SHOWING A TYPICAL "FACE" WITH CUP AND GUTTER AND CHIP OF WOOD TO GUIDE THE FLOW. THE FRENCH SYSTEM CAN OPEN EVEN MORE SURFACE THAN THE AMERICAN WHEN THE LIFE OF THE TREE IS NO OBJECT.

The conservative and final tapping are the same with regard to the width, height and depth of the "face," the only difference being in the number of cups. The essential features of the method are as follows: In February the outer bark is scraped off (not reaching the cambium) for the width and height of the "face" (called "quarre") of the coming season. This stimulates the formation of resin in that part of the tree.

The position of the "face" on the trunk is important, and the most vigorous side is chosen, as indicated by the color and thickness of the bark; in the dunes this is the east and northeast, in the lee of the ocean winds. In March they insert the gutter, a thin zinc lip 1.4 inch wide by 5.9 inches long. It is placed just high enough to leave room for the cup below. During the first year of tapping, the cup rests on the ground; in succeeding seasons it is held firmly against the gutter by a nail placed in the tree just beneath it. We now come to the regulations concerning the shape and size of the "face."

The **"face" must start** above the root collar or swelling and always go up vertically, or parallel with the axis of the tree. Its width must not exceed 9 centimeters (3.5 inches) for the first two years, 8 centimeters (3.15 inches) at the beginning of the third year and 7 centimeters (2.76 inches) the last year, whether it is the fourth or fifth. Compare this width with the 8 to 14 inches customary in our long-leaf pine. The shape of the face is concave, made by a gently curved, narrow, axe-like tool called a "hapchott," kept as sharp as a razor. The depth of the face must not exceed one centimeter (.39 of an inch) measured under a string stretched from one side to the other of the innermost red bark.

When the face becomes too high for convenient use of the "hapchott," an instrument called a "rasclet," on a long

THE INNER EDGE OF A DUNE ADVANCING ON AND BURYING A FOREST. THIS DUNE IS OWNED BY PRIVATE INDIVIDUALS AND HAS BEEN ALLOWED TO ESCAPE FROM CONTROL.

handle similar to our "pull," is used. The advantage of the "hapchott" is such, however, that the chipper not infrequently uses a pole with steps which he leans agains the tree and climbs up so as to use the "hapchott." But in the later stages the "rasclet" is always necessary. When, through the leaning of the tree or other cause, the gum tends to flow to one side and miss the cup, it is kept in the proper channel by chips of wood. In chipping they do not hack off a chunk of wood a quarter to half an inch thick as we do; on the contrary, with the utmost skill they pare off a sliver hardly thicker than a sheet of paper, which is none the less ample to open the resin ducts and renew their flow.

The frequency of chipping is not very different from that with our method. In April and May they chip once a week; in June, July and August once every four or five days; in September and October once a week. This, however, is varied according to the weather, being more frequent in fine weather.

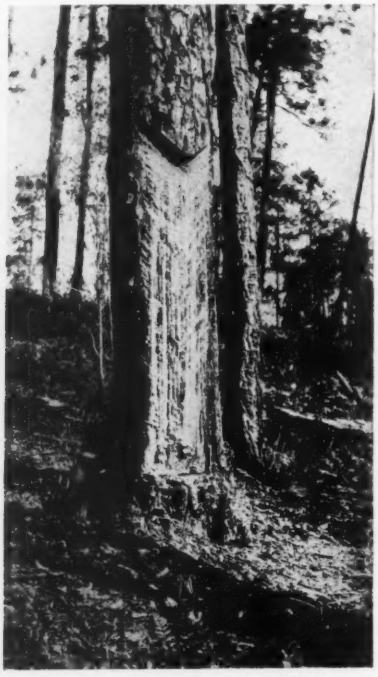
The height of the face on the tree is also carefully regulated, the distances allowed being as follows:

	Tapping — 5 years —		*Tapping* — 4 years —	
Years	cm.	inches	cm.	inches
1st ------	60	23.62	65	25.59
2nd ------	70	25.56	90	35.43
3rd ------	70	25.56	90	35.43
4th ------	70	25.56	95	37.40
5th ------	70	25.56	--	----
Total---	3m. 40 cm.	11′ 2″	3m. 40 cm.	11′ 2″

All the above regulations, not only for height, but for width and depth, are not maximum or minimum limits, they are to be followed exactly. Private owners consider that these regulations make openings too large for the good of the trees. They object to hiring men who have chipped under Government regulations because they have become accustomed to chipping too severely.

The regulations require that trees before being tapped conservatively must have reached a diameter breast height

of 13.7 inches. This requires only 40-45 years because of the rapid growth of maritime pine in that region. Trees to be cut in thinnings can be tapped to death as soon as they are large enough to hold a cup, the minimum being 5.6 inches in diameter at breast height. Trees are always marked before being



AMERICAN METHOD. THE OLD-FASHIONED BOX, STILL WIDELY USED. TREE BEING TAPPED FOURTH YEAR.

tapped; if conservatively, with a mark on the trunk, if to death with a mark on the trunk and base, and a heavy penalty is inflicted on a purchaser who destroys the Government mark.

In conservative tapping only one cup is placed on a tree. After the first four years of tapping the private owner gives the tree a rest of from two to four years, varying with its vigor. After the second four years' tapping the tree is given one or two years' rest, after which it is tapped continuously with one face till five years before the end of the rotation, when it is tapped to death with as many faces as it will support without being killed outright. Under Government management the period of rest is five years, to correspond with the period of cutting, but is not obligatory; only the weakest trees are given a rest. Ten years before the end of the rotation all trees on the compartment are marked for conservative tapping, and five years later all are marked for final tapping.

The essential difference between Government and private management is that the former aims to produce a maximum volume of wood; whereas the latter aims to produce as much turpentine as possible, and considers the wood as secondary. As might be expected, the private owners are managing their forests for the highest financial returns, while the Government must care for the needs of the community as well as for revenue. The government foresters themselves admit that turpentine is more profitable than wood.*

Obviously, the French method of turpentining possesses an elasticity wholly unknown to the American method. Under our method trees can not be tapped until just before they are ready to cut; under the French method they can be tapped for one hundred or more years before being cut. I have seen vigorous trees in the French dunes (near Arcachon) which had been tapped without rest for one hundred and sixty-five years.** (See page 219). On the other hand, when the time comes to exhaust the tree, the French method can, by increasing the number of "faces," open an even larger surface than the American. The comparative

*The silvicultural difference is, briefly, that the Government thins its forests lightly, in such a way as to keep a complete canopy in order to grow the trees tall and straight, and keep a maximum number per acre; whereas private owners choose the best trees to leave, and thin heavily around them to give each tree full sunlight and encourage a large crown development.

**These were in the remnant of a small patch of virgin forest which existed before the dunes were reclaimed.

returns in turpentine of the two may be clearly seen from the following example:

Suppose the rotation is two hundred years, and suppose trees reach 14-inch D. B. H. or tapping size under the French method at an average of ninety* years. Under the American method they can not be tapped until they are one hundred and ninety years old, or ten years before cutting (considering two periods of five years each). In this case the American method causes a dead loss of eighty-five years' tapping time (allowing fifteen years of rest, which is generous), which time would be utilized under the French method. Considering a stand of but ten trees per acre tapped for eighty-five years, with a yield of but one litre per cup per annum (maritime pine yields between 1.7 and 2.04), we have a total loss of 10 litres per acre per annum, or 850 litres (approximately 212 gallons) per acre for the rotation, under the American method.

On the other hand, where timber production is the main object of management, any system like the French, involving small faces which are allowed to heal over, must unavoidably lower the grade of the lumber.

The principles of the French method can therefore be applied only in forests from which turpentine will be more valuable than high-grade lumber; in such forests they are indispensable for a maximum yield of turpentine.

FRENCH METHOD. TREE TAPPED CONSERVATIVELY FOR 15 YEARS, SHOWING 3 FACES. THE FACE JUST TO THE RIGHT OF THE NEW ONE IS PRACTICALLY HEALED OVER.

AMERICAN METHOD, IMPROVED BY USE, OF HERTY CUP AND GUTTER INSTEAD OF BOX. NOTICE WIDTH OF FACE COMPARED WITH FRENCH METHOD.

*These figures are fairly representative of western yellow pine in the southwest.

FIGHTING FOREST FIRES

The Class A fire—covering but a few rods

(Introducing Bill Jones, Forest Ranger)

By E. R. BRUNKE

ON a certain day early in July, just about the time the twelve o'clock noon whistles would have been blowing in your town or in my town, the sun came out from behind the clouds. Also, at that particular moment Mr. Bill Jones, Forest Ranger, topped a rise in the trail and halted for a fresh supply of wind while the horse he was leading stood with legs apart and sides heaving, bent on the same mission. The last half hour had been steady uphill work, during which time Mr. Jones' mind was principally occupied in explaining to his horse what he thought about the fellow who had built the trail "what didn't have no more brains than there's in that piece of rope or he'd seen it ain't no further to go around a hill than it is over it—and a darned sight easier." He said this, however, as a simple relief to his pent-up feelings, because he well knew that the trail crossed the summit for the particular purpose of reaching a lookout point, which purpose it successfully accomplished.

If Mr. Jones had been walking along Main Street of your town or of my town he would undoubtedly have attracted a good deal of attention, and might even have got his picture in the paper, but he was some two thousand miles from my town (I don't know how far from yours) and he wasn't thinking anything about his picture. Briefly, he was a man close to forty years of age, with an aggressive face, wore a black

THE TRAIL CROSSED THE SUMMIT FOR THE PURPOSE OF REACHING A LOOKOUT POINT.

WATCHING THE LOW-HANGING, FOG-LIKE CLOUDS DRIFTING AWAY.

soft hat, a red and black checkered shirt, trousers cut off above the shoe tops, and a pair of Chippeway boots for footwear. He was dressed as a lumberjack because he had always been a lumberjack, and different from the way they do things in your town and in my town, he didn't care a rap what anybody thought about it. Only, if you'd been looking square at him from in front you would have noticed pinned to his shirt a little brass, shield-shaped badge, with a pine tree in the center and the words "Forest Service, U. S. Department of Agriculture."

Now, Mr. Jones wasn't in a particularly happy frame of mind because it had been raining off and on for two days, and he would have explained to you quite graphically that it isn't any fun going over a steep, rough, brushy trail in nice weather, let alone rain. Hence, we mentioned that the sun came out from behind the clouds, which was a source of considerable satisfaction to one Bill Jones, Forest Ranger.

The clouds broke and rapidly dispersed. The sun beamed down warm and showed immediate signs of becoming sultry. As the man stood there he gazed around across the tops of the trees, watching the low-hanging, foglike clouds drifting away, and straining his eyes on the distance as if trying to catch a glimpse of the farthest peak. The dripping trees glistened in the sun, and then the warm, monotonous heat of midday became apparent. A woodpecker was industriously working over an old snag with his busy tapping. A few insects droned lazily. Somewhere in the trees a squirrel was chattering intermittently, and off down the hill could be heard just the faintest gurgle of running water. All else was quiet. The heat of day had it's hold.

Bill Jones was hungry. His canteen was empty and he was also thirsty. Now Bill Jones' dinner was to be some heavy baking powder bread left over from morning ("Dough God," he called it), alleviated as much as such were possible by a couple slices of tough, salty ham. For dessert he had half a box of raisins left. Altogether, he doubted very much whether that mix-

ture could slip all the way down without sticking en route unless he could get a little water.

"Skinny," he said to his horse, which was as fat as his name was thin, "we'll go on down till we——."

Then he straightened up suddenly and, raising his nose in the air, sniffed heavily, unbelievably. No, he must have been mistaken, he couldn't have smelled fire. There wasn't any fire on earth could live through those two days of rain, particularly a small fire—and there were certainly no evidences of a large one. Unless (he brightened with the thought) there were some campers down in the valley below. But it was a little early for trout or birds and, of course, there wasn't any thought of the hunting season. He must have been dreaming, or maybe there was a smell drifting from an old burn of last year. Still, literally speaking, his whole heart was in his nose and his whole nose was in the air. Almost like some wild creature he continued to sniff, turning in all directions and bending his whole attention toward his object. Why, of course, he was dreaming. "Come out of it, old-timer, you're hungry and your mind is wandering," was what he said to himself.

And then it came to him again, that strong, odorous, unforgettable smell of burning pine, just as plain as the nose on his face. He took out his field glass and looked around, looked and looked and looked, scrutinizing everything within range. A blue haze was in the trees and the air was still heavy, but he could see no smoke. A puzzled expression crossed his face and he wrinkled his forehead. The noonday quiet was still apparent.

He lowered his glass and held himself tense with wonder. Then he heard it—a sharp snapping crack, followed by a couple more, a pop, and a sizzling sound as made by the burning of green moist leaves. He located the sound down the hill below him and raised his glass. For a spell he could see nothing different than he had before—the same blue haze, and then he saw so plainly that he wondered how he had ever missed it, a thin stream of smoke wending its way lazily through the tops of the trees and then disseminating into haze itself. It was fire.

He got out his shovel, wondering

SKINNY—WAS AS FAT AS HIS NAME WAS THIN.

MAYBE THERE WAS A SMELL DRIFTING FROM AN OLD BURN OF LAST YEAR.

how in the deuce a fire could burn through all that rain, how long it had been burning and how much area it would probably cover. He guessed it hal been caused by lightning. There was no thought of dinner now, nothing but the fire. He took the axe along, too, and then worked down the hill. It was steep and rocky and brushy, and once in a while even Skinny would prick up his ears at the sound of his master's voice cussing cheerfully.

The fire wasn't over two hundred yards from the trail and he walked right on to it. A glance took in the situation and brought a sigh of relief. For an irregular distance of about twenty or thirty feet around the base of a large white pine tree the humus had been burned. In some places the fire had died out entirely; in others it was still smoking, eating its way slowly underneath the damp surface, and now and then spitting forth a few sparks. The end of an old down log was smouldering, breaking occasionally into a flame for a moment and then lapsing again into a lazy smoke. Even as he looked, a portion of the damp surface humus collapsed, exposing a glowing mass which shivered for a moment and then broke into a flame, reached the branches of an overhanging huckleberry bush and with a sizzling sound ran through the bush, consuming and withering the leaves. There was no wind to fan the flames. They had their feast and seemed to settle back with the satisfaction of knowing that with a little patience there would be more to come—more—more—more, until they would be sweeping whole mountain sides, and instead of little huckleberry bushes would be lapping up great monarchs of the forest. That would be real feasting. Ah, the joy of anticipation. Only, they hadn't figured on one Bill Jones, Forest Ranger, whose particular business it was to see that the little flames died a speedy, ignominious and unnatural death, with emphasis on the speedy.

The tree that had been struck was of the species of western white pine (Pinus Monticola) and was an excellent example of its type. Easily three

feet in diameter, its clean shapely body went straight up for more than a hundred feet. Round as a cylinder, with drooping, shapely branches filled with soft almost bluish-green needles, it had been a thing of beauty to the eye. Only it had made its last stand. Its top had been completely shattered by lightning. Numbers of branches were broken and hanging, and great strips of fresh white wood showed in spiral lines where the lightning had wound around the trunk and stripped the thin bark. Toward the bottom a large slab had been ripped from the tree and a hollow

HE TOOK OUT HIS FIELD GLASS AND LOOKED AROUND.

eaten out by the fire at the base leaving but a shell. Huge roots had been exposed and burned, and it was quite apparent to the experienced eye that was looking that before many days the green leaves (needles) would turn to brown and then fall, the branches would gnarl and curl, and only a great snag would be left as a landmark, to probably go crashing down before a heavy wind some day. And the little cones that showed thickly throughout the top would never mature and serve their purpose as reproducers, but instead, would but fall to the ground and rot.

Mr. Jones laid down his axe, spat on his hands, took up his shovel and got busy. All around the edge of the fire he worked, commencing where the fire showed an inclination toward rapid advancement under the favorable heat of the sun, digging and exposing the brown mineral soil, and shoveling the burned material back into the fire. Where the roots were large or snarly he cut them out with the axe. In the center apparently the fire had burned hard because he sank in the ashes to his shoe tops. Where the ground was charred and black, and the fire seemed out, he got down on his knees and felt carefully around with his hands.

Now Bill Jones was a good ranger. Experience had taught him not to take any chances, even the slightest, with fire, so he trenched in the burned part as well as the burning; he worked his line around until he had the whole area completely corralled. He stopped, mopped his brow, took a fresh grip on his shovel, and went over the whole trench again, widening it here and there, cutting away the brush, digging a little deeper into the fresh moist earth, and smothering a blaze now and then with a shovelful of dirt. The smouldering log he rolled into the center of the burned area, and then carried water in his hat from a nearby spring until he was convinced that there wasn't so much as a spark of fire left in the log.

A dozen trips he made around the fire, cleaning and scraping and strengthening his trench until he felt almost satisfied that if all the rest of the woods were burning he would be safe himself if he stood in the center of his fire line. For three or four feet the line was cleared of sticks and branches and brush. For two feet and more the mineral soil had been exposed, brush leaning out over the trail was cut away, and, in fact, the whole area had kind of a ship-shape appearance. It was close to four o'clock before he was ready to leave, but there was considerable satisfaction in his mind as he gazed over his work. He was tired, he was sweaty, he was smoky, he was dirty, but he was extremely happy in

the realization of having accomplished something. If he had been from the slangy east, he might have addressed the fire and said "I beat you to it that time—you'll never get away from that trench." But, as mentioned before, Bill Jones was a good ranger, he had had a lot of experience, but best of all he had a lot of good hard common sense, and he knew that a fire is never out until it is ALL out. What he did, however, was to sit down and make an entry in his notebook.

"July 3, 19—. Discovered small Class A fire about noon today, some 200 yds. below the second rise in the Rock Creek Trail, in the NE ¼ of Sec. 10, T. 46 N., R. 6 E., B. M. (which, being translated reads, North East quarter of section 10, township 46 North, Range 6 East, Boise Meridian). Had it all corralled by 4 o'clock. One green white pine tree struck by lightning and destroyed. This is the first time I ever seen a greet tree struck but this sure was. Will camp at Elk Horn cabin tonight so as to get another look at the fire in the morning. Kept fire within an irregular radius of 25 ft. All out of grub after tonight. Gave Skinny the last of my cornmeal as aint had no oats since yesterday morning. He ate the meal. Funny how that fire could burn through all that rain to, but it sure done it."

BASKET WILLOWS A PROFITABLE CROP

By Geo. N. Lamb

IN Germany, and in many other European countries, basket willows are considered a farm crop. It is true that in certain localities this industry has become specialized, but nevertheless it is also one of the crops of the small farmer. On any farm one is likely to encounter a small patch of osiers growing somewhere on the farm, usually along a stream where the plants can obtain an unfailing supply of moisture. This patch of osiers is one of the fixed institutions of the farm. The patch itself may have been in existence for several decades, or, if the land is not suited to a long-continued production of willows, it may have been changed from time to time; but the farm is never without its willow holt, as these patches are commonly called.

The European farmer ordinarily sells very few, if any, of the rods he grows. Sometimes, when he has an unusually large supply, or his own demands are light, he may dispose of a few rods, but this is seldom the case. Ordinarily, the farmer utilizes his own crop. During the winter or early in the spring before the sap rises, the rods are cut near the ground with a large hooked knife. A part of these long, slender switches are allowed to dry with the bark on and later go into the making of coarse hampers, baskets, and crates which are used on the farm and as receptacles for shipping and marketing farm products. Such basket ware used for shipping is very light and durable and is cheap enough to be used only once, although ordinarily it is used several times. The coarse baskets used on the farm are subjected to the hardest kind of usage, but are very durable, much more so than the baskets used on the farm in this country, and at the same time they are not more expensive. Especially in gardening are such baskets very useful, not only in the work in the field but also in getting tender crops to market. The baskets or hampers may be filled and piled high on the wagon without the least danger of injuring the fresh appearance of the stuff, so essential in obtaining the best prices. The empty baskets are often carried back to the farm to be used again, or it may be that the purchaser of the crop may wish to obtain baskets of that nature. In such

A WAGON LOAD OF WILLOWS, PEELED AND READY FOR THE MARKET. THIS LOT IS WORTH SEVEN CENTS A POUND.

a case they can be sold at a small profit to the farmer. In this manner he not only gets top prices for his produce on account of placing it on the market in good condition, but he also receives a fair price for his willows and wages for the time used in making the baskets.

Another portion of the rods is bundled and placed in a shallow pit containing a few inches of water. When warm weather comes the sap rises in the rods and the young leaves unfold. The rods are then ready to peel, since the region of growth between the bark and the wood has begun to produce young, tender plant cells which are easily broken, thus separating the bark from the wood. The peeling is done by pulling the rod through between two iron bars which split the bark and allow it to drop off.

The rods prepared in this manner are white and brittle when dry. The popular supposition is that such rods retain the flexibility they have when green, but such is not the case. When they are worked up into baskets, the basket maker soaks them for a few minutes and then covers them with damp sacks. Treated in this manner, they can be twisted and bent into almost any form without breaking. This could not be accomplished at all with a green willow.

This material is much more valuable than the dry rods which have not been peeled. The cost of peeling is considerable and the articles manufactured from peeled rods, while they can be used in much the same way as those made from unpeeled rods, must be used many times. Ordinarily, the farmer makes a higher class of willow ware from his peeled rods. Chairs and baskets to be used about the house are often made. The German farmer frequently spends much of his time in the winter making various kinds of baskets. He adapts his product to the demands of the season, sometimes producing fancy baskets to be sold to jobbers or wholesalers, and at other times supplying the commoner kinds of baskets to local trade.

In America basket-willow growing

THE METHOD OF MAKING CUTTINGS OF THE AMERICAN GREEN BASKET WILLOW.

and willow manufacture is largely a specialized industry. In some few cases growers, who are also manufacturers, grow other farm crops, but as a rule these are only side issues, the main energy of farming being devoted to growing willows. This has led to the localization of the industry around certain centers, and on the general farm very few, if any, willows are grown, although they could often be grown as profitably as, or even more profitably than, under the same conditions in Europe or by specialists in this country. Since willow growing, by nature of its requirements, is fitted only to land which has an unfailing supply of moisture, and such land, while common, is most frequently found in small patches over a wide area, the chances for the success of small scattered holts are much greater than for large ones. The labor problem on a large willow farm is a hard one to solve, while growing willows as a minor crop often helps to solve the labor problem of the farm. The operations connected with the small willow holt on the farm can be done at odd times when other work is slack and at times when weather conditions make other work impossible. The willow holt also offers a side line for some member of the family to devote spare time to.

Any one may start with a few plants at no expense whatever, as the Forest Service furnishes a small number of cuttings of the best varieties of basket willow, free of charge. All willows are easily propagated by cuttings; starting with a few cuttings, it is therefore a simple matter to cut up the rods produced each year into other cuttings, and in this manner gradually increase the size of the holt. When it is remembered that a tenth of an acre will produce a ton of green willows of the American Green variety if properly planted and cared for, it is evident that only a small area is needed to produce a considerable quantity of willows. The Forest Service distributes free a bulletin entitled "The Basket Willow," which contains instructions on how to plant, cultivate, harvest, and market the product.

In considering the advisability of growing basket willows, the farmer nearly always overlooks the fact that he can make his own baskets or have them made on the farm. It is much simpler than is imagined to learn to make baskets. The method of procedure is very simple, and any one with a little practice can soon learn to manufacture a really superior article. The easiest way to make a start in basket-willow growing is to obtain a basket maker from a nearby city as a general farm laborer. Conditions are so unsatisfactory among basket makers in many cities that this could easily be done by paying him no more than is usually paid for a good farm hand. Most of these men are foreigners, and often country-bred fellows, who should prove to be as satisfactory help as is generally found on the farm. From such a basket maker it would be easy to learn the general principles and the rest would simply be a matter of practice. Once having acquired sufficient knowledge to manufacture baskets, the willow grower in a small community is assured of a profit in willow culture. If the market for peeled rods fails, which is not likely to be the case, the material can always be manufactured on the farm. This will allow a profit on growing the willows and also on making the baskets above paying wages for the work. In this way, a considerable sum may be made during the winter months with little effort. Compared with the work in the fields, the making of baskets becomes more of a recreation than hard work. In talking to a large number of basket makers, not a single man was found who did not enjoy his work, and to many the construction of baskets is actually fascinating.

Viewing conditions both in Europe and America in rural communities and the present status of willow growing in this country, it is safe to predict that willow growing is sure to become more

TWO VARIETIES OF BASKET WILLOWS. THE TALL LARGE-LEAVED WILLOW AT THE LEFT IS THE AMERICAN GREEN, AND THE SLENDER SHORTER WILLOW TO THE RIGHT IS THE PURPLE VARIETY.

general, especially among the small farmers. It fills a certain economic need both in the utilization of land unsuited to the production of almost any other crop, and in the production of articles almost indispensable on the farm when once their value is fully known. Willow growing also provides a satisfactory employment for farm help at times when it would otherwise be contributing little or nothing to the revenue of the farm.

A LOCAL RESULT OF FOREST EDUCATION.

A friend in Northern Michigan writes to a director of the American Forestry Association in the following strain:

"This forestry education has made people think that a briar patch is a gold mine and a mullen stalk a mint; even garden weeds are sold by the cord and a man will buy a mill to saw up a corn-stalk. Naturally stumpage is high, so to get square the lumberman cleans everything as he goes and one couldn't glean a bundle of faggots on a ten-acre tract after it has been lumbered. That leaves miles and miles of desert absolutely worthless where trees will be growing knee high just 1,000 years hence. That seems to be the result of the great conservation movement in Michigan."

REFORESTING SANDHILLS.

The Forest Service is successfully reforesting a considerable area in the sand hills of Nebraska and Kansas, where the soil is so loose in texture that it blows away as soon as it is cultivated. Therefore, according to the Government's foresters, the problem has been to grow trees in competition with the native grasses, both making rival demands on the small amount of moisture. If the grass cover is removed the soil blows out completely and exposes the roots of the trees. The success already attained indicates, in the judgment of the Government foresters, that a large part of the sandhill country will become timber-producing.

THE WOOD-USING INDUSTRIES OF CALIFORNIA*

By Andrew K. Armstrong

A SHORT time ago the California State Board of Forestry in co-operation with the United States Forest Service undertook the study of the wood-using industries of California with two main objects in view:

1. The determination of the kinds and amounts of wood demanded by the industries manufacturing finished products, with particular reference to the amount produced in the State. This is intended to be an aid toward the adoption of a rational State forest policy, inasmuch as it shows what kinds of woods ought to be produced for home consumption.

2. The dissemination of information to the buyers and sellers of wood in the State.

Accordingly, this article covers only the woods worked up into finished products within the borders of California, disregarding cross ties, lath, mining timbers, shingles, telegraph and telephone poles, rough lumber used in building operations and other structural work, and dressed lumber, manufactured elsewhere, which is used in the State without further preparation.

The last available returns of the United States Census, taken in 1910, show that in the production of lumber California ranked fourteenth in the list of forty-five States. Her 252 mills, in that year, produced 1,254,826,000 feet, board measure, or 3.1 per cent of the total cut of the United States.

California manufacturers report the use of 63 species of wood; and, in 1910, they consumed 662 million feet, or 35 per cent of the total cut of the State, in producing their commodities. Twelve species were logged wholly within the State, five partly within, and the remaining 46 wholly without. Of the latter, 24 were grown in foreign countries, including the Philippine and Hawaiian islands.

Although redwood grows also in Southwestern Oregon, the lumber is exclusively produced within the borders of California by 67 mills, whose average cut each for 1910 was about 8,112,000 feet board measure. In the latter year redwood ranked twelfth in the amount of lumber produced within the United States.

Redwood is one of the few soft woods that reproduce bountifully from sprouts. Few trees surpass it in that particular, and the vigor of the sprout growth is remarkable. A large portion of the forest is renewed in that way and the largest trees retain their ability to send up shoots from the stump.

The wood is light, soft, brittle, and moderately strong; the grain usually fine, even and straight, though sometimes curly; the color light to dark red, with thin, almost white, sapwood. It splits and works easily, and polishes well; and is very durable in contact with the soil.

Western yellow pine grows in many of the Western States, but in the production of lumber from this species California ranks first, with 25.5 per cent of the total cut of 1910. In the latter year this pine ranked sixth in the amount of lumber produced within the United States, being exceeded only by Southern yellow pine, Douglas fir, oak, white pine, and hemlock.

The wood of the yellow pine varies greatly; in one locality alone four kinds of trees are distinguished. The wood is rather heavy as compared with that of sugar pine; is hard, fairly strong, sometimes brittle, and usually very resinous. The heartwood is reddish brown in color, and the sapwood (often very thick) yellowish white. The sapwood from certain trees is very light and nonresinous. When finished it has a satiny luster, and is equal to sugar pine for finishing purposes.

It is extensively used for building materials, such as scantling, beams, etc., railroad ties, and for the purposes men-

INTERIOR OF BOX FACTORY, SHOWING FINISHED SIDES, TOPS AND BOTTOMS OF BOXES AND CRATES.

tioned later in this report. Small trees 6, 8, and 10 inches in diameter, are used for mine props, although the wood is not durable in an untreated condition.

DOUGLAS FIR.

Douglas fir, in 1910, ranked second in the amount of lumber produced in the United States. Although California ranks third in the production of Douglas fir lumber, only 2 per cent of the total amount produced is cut within the State.

The wood is strong and hard, not very heavy, and fairly durable. The grain is straight, but varies from very fine to very coarse. Its great strength gives it a value for bridge timbers and heavy construction work, and its durability renders it useful for railroad ties, mine props, etc. Very little Douglas fir lumber is shipped, as most of it is consumed locally.

The Sierra Douglas fir is generally sound, but low in its content of clear lumber. The bole is comparatively short and tapering, and this, combined with an ill-pruned trunk, results in a high proportion of knotty lumber.

Sugar pine, in 1910, ranked twenty-fifth in the amount of lumber produced in the United States. It is cut only in two States, Oregon and California; and in 1910 the latter produced 98.4 per cent of the total cut.

The wood is very light, soft and not strong; the grain coarse and straight. It is generally very resinous, with large and conspicuous resin ducts. The heartwood is light brown in color, while the sapwood is yellowish white. When finished the wood has a satiny luster, that renders it excellent for interior finishing.

The wood is still used for making shakes (a split shingle 36 by 6 inches), as its straight grain, and the ease with which it splits, makes it preferable for this purpose. Logs, too knotty to cut into uppers, but otherwise sound and straight grained, are sometimes turned into bolts for match work.

WHITE FIR.

White fir, in 1910, ranked twenty-third in the amount of lumber produced in the United States. It is cut in several States, but, in 1910, California ranked first in the production of lumber from this species, with 49.2 per cent of the total cut.

Its commercial distribution is entirely within the yellow pine-sugar pine belt. It is not attractive to the lumberman at high levels, except where it occurs mixed with timber trees of the better class. Although it is the most recent of the Sierra species to become merchantable, its standing on the market is insecure. The reason for this lies in the fact that its wood is similar to that of the pines, but far inferior, in most respects. However, it makes excellent paper pulp and is now used most extensively for this purpose. Hitherto, it has had no field outside of that covered by sugar and yellow pine, in which it could not compete.

Its principal future use, however, may be in the manufacture of paper. It is soft, white, and has a long, strong fiber, three qualities required of a good paper wood. It is now being utilized for this purpose, as, in 1910, 30,845 cords were converted into pulp by means of the mechanical and sulphite processes. This amount, 0.8 per cent of the total pulp wood consumed in the United States, was prepared in Oregon and California.

INCENSE CEDAR.

California is the only State in which incense cedar is cut. The species occurs in the Sierra and coast ranges. Its total stand of live saw timber in the National Forests within the State is about three and three quarter billion feet.

The species is not highly considered by Sierra lumbermen. It has a rapid taper; and the large trees are almost invariably unsound, as cavities filled with brittle, brownish material occur throughout the heartwood. The wood between the cavities is usually sound; and except in so far as the unsoundness affects the strength or appearance of the lumber, it is not objectionable, as this rot ceases after the tree is cut.

The chief future use of the wood will probably be found in the manufac-

BAR AND STORE FIXTURES AND INTERIOR FINISH, IN FINISHING ROOM OF FACTORY. COUNTER IN FORE-GROUND WITH GENISARO TOP AND ELM FRONT.

PARAFFINING SMALL KEGS IN COOPERAGE FACTORY. OLIVE KITS ABOVE; WATER PAILS BEHIND THE MACHINE.

STOCK DRYING AND STOREROOM OF VEHICLE FACTORY, SHOWING OAK AND HICKORY RIMS, AND BIRCH AND ELM HUBS.

ture of the cheaper grades of lead pencils. Here its softness, straight grain, and whittling and staining qualities make it a valuable substitute for the rapidly disappearing Southern red cedar. The sound wood between the rotten cavities can be converted into pencil slats with little waste.

BLACK COTTONWOOD.

This species is abundant along streams in the Sierra and Southern cross ranges, but much less frequent in the coast mountains. It is generally found between 3,000 and 6,000 feet above sea level.

The wood is soft and straight grained; in dense stands it is fine grained. The color is a dull, grayish brown. Large logs, obtainable from the best grown trees, give clear wide lumber.

RED FIR.

This species occurs in the Northern part of the State, extending Southward in the coast ranges to Lake County. It is found throughout the Sierra, but chiefly on the West side, forming nine billion feet of the total stand of live saw timber in the National Forests within the State.

The wood is one of the heavy fir woods, soft but firm, rather brittle, straight and usually fine grained. It is considerably more durable, in an unprotected state, than the wood of any of the other native firs. The color is yellowish brown, with a reddish tinge. It has good working qualities, which should render it useful for a number of purposes to which the pine is put.

LAWSON CYPRESS.

Oregon and California produce all the Lawson cypress lumber that is utilized; but, in 1910, Oregon produced 27½ million feet, board measure, whereas the amount cut in California was too small to report.

The wood is light and moderately strong; the grain fine, even and compact; and the color light yellow or almost white, though occasionally reddish, the thin sapwood being hardly distinguishable. It is abundant in odoriferous oil, distasteful to insects and vermin; and is susceptible of a beautiful polish, as well as easily worked and durable.

YUCCA.

This species ranges from the Southern base of the San Bernardino Mountains to the coast, and Northward to Monterey, sometimes ascending mountain slopes to 4,000 feet elevation.

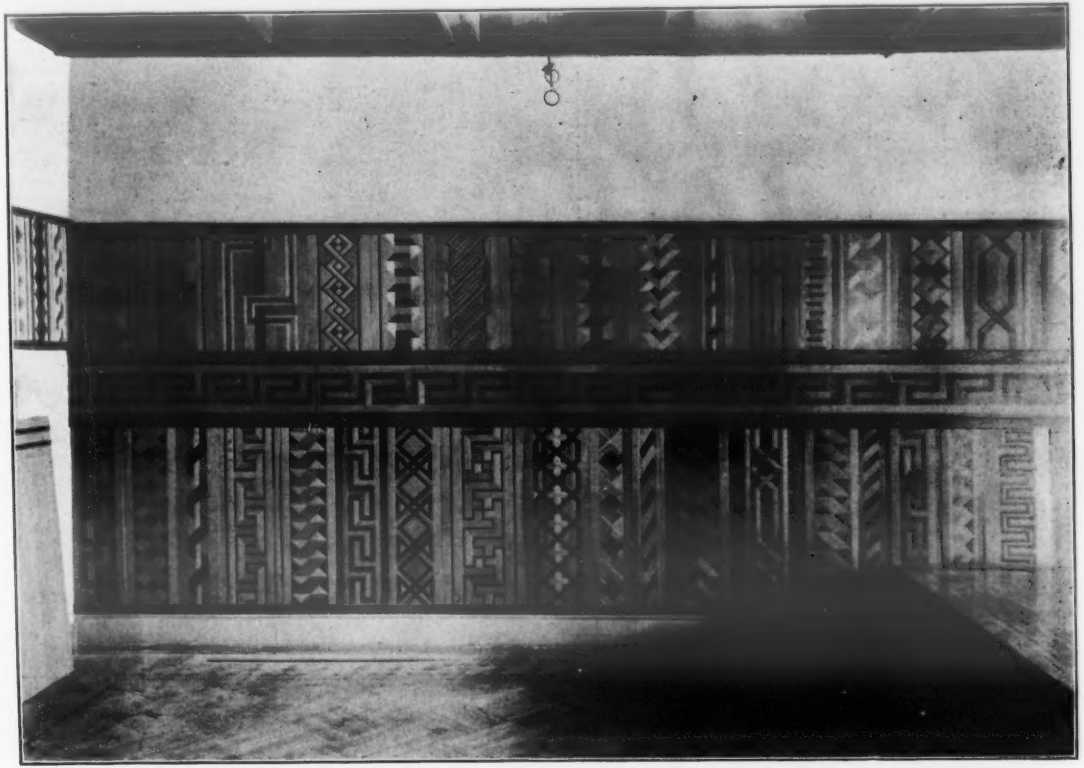
The wood, pale yellowish white in color, is rather soft and light when dry, but tough because of its strong fibers. The manufacturers of Yucca products will accept no tree under ten inches in diameter; and, after turning off the veneer, they leave a core five inches thick.

BLUE GUM.

This species was introduced from Australia in 1856. It reaches its greatest development along the coast, and in river bottoms, where foggy days are common and the annual rainfall at least 15 inches. When grown under favorable conditions it ranks among the fastest growing trees in the world.

The wood is yellowish white and easily polished. The fibers are much interlaced, making it tough and difficult to split. The grain is often irregular, which makes the wood liable to chip under the planer, but gives it a very pleasing effect when smoothly finished.

So far it has been used successfully only where specially selected trees are sawed, and the lumber carefully air-seasoned for long periods. It is impossible, at present, to take the run of a eucalyptus grove and turn it into merchantable lumber without making prohibitive the cost of the material obtained. This is chiefly due to the excessive checking and warping, and the great and uneven shrinkage when drying. Under these conditions it can compete with the Australian blue gum neither in price nor quality, should any great demand for eucalyptus lumber arise. Blue gum is not durable in contact with the soil, and is a very poor substitute for Douglas fir piling in waters where the marine wood-borers are active.



DISPLAY OF SAMPLES OF OAK, BIRCH, MAPLE, WALNUT, AND SOUTH AMERICAN WOOD FLOORING.

SYCAMORE.

This species ranges from the lower Sacramento River, through the interior valleys and coast ranges, to Lower California. The trunks are often short, giving off several trunk-like branches. The wood is pale brown, tinged with red, cross grained and very difficult to split, but it is attractive and suitable for interior finish and cabinet work.

PEPPERWOOD OR LAUREL.

This species occurs in the coast regions of the State; and also in the Sierra from the head of the Sacramento Valley to the Southern border; but its commercial range is limited to the Northern coast ranges. The largest single merchantable stand contains about five million feet, board measure.

The wood is moderately heavy when dry, hard, very firm, and fine grained. It is a rich yellowish brown, often mottled, and the sapwood is very thick. It is a valuable cabinet and finishing wood as it has a beautiful grain when polished.

MOUNTAIN MAHOGANY.

This species is found in the Sierra Nevada Mountains and South to the San Jacinto Mountains. The wood is very dense, fine grained, and exceedingly heavy. It checks and warps badly in drying, after which it is very hard. Freshly cut wood has a distinct mahogany red color, which browns upon exposure.

TANBARK OAK.

The tanbark oak ranges from the Northern border of the State through the coast ranges to Santa Barbara, and from the Humboldt region Eastward, by the way of the Shasta Mountains, to the Sierra Nevada, following the latter range as far South as El Dorado County.

Some few attempts have been made to utilize the wood. Flooring was manufactured for a time, and a few thousand feet were converted into furniture, cabinet work, and showcases. The principal difficulty encountered with tanbark oak is the fact that it checks excessively and is liable to decay before it can be manufactured into lumber. This is due largely to the custom of felling the trees in the spring and early summer, at which time the bark can be removed without difficulty. It is well known that the proper time to cut hardwoods for successful handling is in the fall and winter.

It has proved too porous for tight cooperage stock, resembling red oak in this respect; but from experiments that have been made upon it, it appears to be a good wood for wagon rims and auto-top bows. Outside the few uses to which it has been put, some of it is sold for fuel; but the greater portion is allowed to rot in the woods after the bark has been peeled.

THE CALIFORNIA OAKS.

There is at present scarcely any use except as fuel for the various species of California oaks. The old timber is generally too brittle and weak for purposes where strength is required; and the large percentage of rotten trunks in an old stand makes the wood practically useless for lumber purposes. It seems probable, however, that the young growth under 12 inches in diameter possesses sufficient strength and toughness to render it valuable for tool handles and vehicle and implement stock.

MADRONA.

This species grows in the Northern cross ranges of the State, in the coast ranges Southward to the San Gabriel Mountains, and Southward in the Sierra to the head of the Tuolumne River, ranging from sea level to 3,000 feet elevation.

The wood is pale reddish brown, with a thin whitish sapwood; rather heavy, dense, fine grained; very hard when dry, but cuts like softwood while green; and it is usually quite brittle. It makes a handsome flooring, for which small quantities of it are now being used.

Mahogany, Japanese oak, and Spanish cedar were the principal foreign woods used in California in 1910.

INDUSTRIES.

Six hundred separate operators manufacture finished products, although all of them do not consider wood as their principal raw material.

STOCK DRYING ROOM OF VEHICLE FACTORY, SHOWING OAK AND HICKORY SPOKES, AND ELM HUBS.

Sixty-six per cent of the timber that they use is grown in California; 28 per cent in Oregon and Washington; 5 per cent in the remainder of the United States; and 1 per cent in foreign countries, including the Philippine and Hawaiian islands. Sixty-four per cent of the Western yellow pine lumber produced in the State is used in the wood-using industries, together with 20 per cent of the redwood, 18 per cent of the Douglas fir, 32 per cent of the sugar pine, 21 per cent of the white fir, and 13 per cent of the incense cedar lumber. Western yellow pine ranks first in amount and value; redwood second in amount and value, while Douglas fir stands third in amount and ranks second in value.

Among the industries specified, Douglas fir ranks first in ten; redwood in nine; plain white oak, Eastern maple, and Sitka spruce in two; and Western yellow pine, black cottonwood, Lawson cypress, Spanish cedar, hickory, red gum, yucca, Oregon maple and cherry, each first in one.

*Extracts from report by courtesy of the California State Board of Forestry.

WEST VIRGINIA FORESTRY FROM THE LUMBERMAN'S STANDPOINT

By Merritt Wilson

WE lumbermen recognize the fact that unless something is done to protect the growing timber and reforest the cutover lands of West Virginia that the lumber industry, one of the leading industries of our State, will soon be almost a thing of the past. The uncut area is getting smaller every year and it would seem that the only way to have a supply for the future is to grow it.

The question then of growing timber for the future, confronts us; it is a big undertaking but not an impossibility. Our State is perhaps as well adapted to growing timber as any State east of the Mississippi river, unless it is Maine, and while it is well adapted to growing timber, much of the area is of little value for anything else, owing to the rough and mountainous character of the country.

Recognizing the importance of taking care of the timber we now have, and growing a supply for the future, the question naturally arises as to the best methods to be adopted in order to bring about the desired results. Co-operation of some kind is necessary, but as to the best methods to be adapted in organizing we are frank to admit that we do not know just what to recommend.

It will take some experimenting along different lines to find that out. We believe that a law should be passed by the State establishing a Forestry Commission and that said Commission should be empowered to buy cut-over lands and to co-operate with individuals and companies in protecting cut-over areas from fires.

Fire, the great destroying element, is the worst thing we have to contend with in growing a new forest. This part of the country naturally reforests itself if the fires are kept out. Not always with the same kinds of timber that formerly stood on the ground, but with some kinds, and usually with the same kinds if the ground is not burned over. That being the case, the question arises as to the best methods of keeping the fires out.

In this part of the country there are only two periods of the year that there is much danger of forest fires. The one is in the early spring after the snows go off, and before the leaves and vegetation come on; the other is in the fall after the leaves come down and before the rains and snows set in; on an average of about two months each year. That being the case great care should be exercised during the dry periods of the year to see that fires do

THIS SHOWS THE GROWTH OF TIMBER ON LAND WHICH WAS CUT OVER SOME SIX YEARS AGO.

not get started and to hold them in check in case they get started. At present more fires are started by sparks from railroad locomotives than any other one cause. Logging engines set out quite a few fires and a great many are set out by farmers in order to make range for their live stock. This latter practice is not as common as it used to be, but it has been practiced for a long time and has destroyed a vast amount of valuable timber. Fires frequently get out from clearings and are sometimes set out by persons just in order to see the woods burn. The railroads, logging roads, and persons who carelessly let fires get out, should, in our opinion, be made to pay the damages for all property destroyed.

The so-called most improved mechanical devices should not excuse the railroad companies from fires, if these devices do not actually prevent setting out fires. It is an easy matter to prove by some negligent employe, who has neglected his duty in the way of keeping up spark arresters, etc., that they were in good shape on the very locomotive that sets out the fire, but when at night you see sparks from a locomotive flying into the air fifty feet or more high, and when you travel along every line of railroad in this part of the State and see that nearly every bit of the country near the railroads has been burned over time and time again, it ought to be proof that the railroads are not exercising even ordinary care to keep fires from getting out. It is our opinion that companies and individuals carelessly letting fires get started should be made to pay damages for any timber or other property destroyed. In other words, the responsibility of the loss should be thrown upon the party creating the loss. Standing rewards should be offered by counties or the State for information that will lead to the arrest and conviction of parties setting out fires intentionally. The Commissioners of Pocahontas County have adopted the reward plan, and while we do not know that it has done any good up to this time, it is a step in the right direction, and should be adopted throughout the State.

THIS PICTURE WAS TAKEN FROM THE SAME SPOT AND WITH THE SAME CAMERA AS THE PRECEDING ONE, AND SHOWS THE LAND AFTER IT WAS BURNED OVER AND ALL THE TIMBER KILLED.

The very important thing is to keep the fires from getting started. As to the best methods of fighting forest fires, that, of course, largely depends on the kind of country that is being burned over. As a rule they cannot be held in check in the heat of the day, but they usually die down at night, and if taken in hand early in the morning with sufficient force they can be put out around the edges, and thus held in check. The best method is to put out all the burning leaves, logs, etc., around the edges of the fires, and cut down all burning trees that the fire is likely to blow from, then leave guards along the fire line with pails of water to keep it from kindling up during the heat of the day.

Back-firing is a method frequently adopted, but as a rule it does more harm than good. The plan of making roads at frequent intervals, or laying the lands out in sections, is a good one, and should be adopted. In that case not only should the roads be cleared of everything that will burn, but all dead trees near the road should be cut down in order to prevent the fire from blowing from them across the roads; thus in every instance holding the fires on as small area as possible.

We do not believe that people, as a rule, realize the value of cut-over lands and of young growing timber, or they would exercise greater care in protecting same. It has been a common practice to cut the best timber off a piece of land and to then let it go; if it burns over let it burn, if it grows another stand of timber let it grow it, but do not put any expense on it. It is our opinion that most cut-over lands would be a good investment at the prices they could be bought at today. Take, for instance, a piece of cut-over land at say $3.00 per acre, probably about the average price of the cut-over lands of the State. Interest on the investment, taxes, and fire protection, would probably amount to about as much in ten years as the property cost in the first place, thus making it stand $6.00 per acre at the end of ten years. At the end of another ten years it would double in costs

again, making it stand $12.00 per acre.

There is not much doubt but that the second growth timber where properly protected will be worth on an average much more than $12.00 per acre in this State in twenty years from now; not that a tree will grow from nothing, we might say, to be of any size worth speaking of in that time, but, as a rule, timber is only cut down to a diameter of about ten inches and a tree of a size smaller than ten inches will grow to be considerable size in twenty years. Hence the importance of keeping the fires out and not allowing it to destroy the young timber too small to be of much value today, but large enough to make rapid growth and to be of considerable value in the not great distant future.

Increased values of timber products must be taken into consideration when we consider whether or not the timber growing business is going to be a profitable one. Within the last few years values have greatly increased, and it is only reasonable to suppose that they will continue to do so as the present supply becomes exhausted. That being the case much timber that is now of but little value will be quite more valuable within the next few years. It would appear to us that we should make a special effort to preserve the future timber supply of this State. Such States as Ohio, Indiana and Illinois cannot grow timber profitably on account of the value of the land for farming purposes, but in this State, where little of the land is adapted to farming, it appears to us that we should try in the future years to come not only to produce enough timber for our own wants, but to supply some of the other sections of the country that are without timber, as we are doing at present.

If we have, we will say, 12,000 square miles of area in this State better adapted to growing timber than to growing anything else we should grow annually nearly as much as we are now producing, which is about 1,400,000,000 board feet. This estimate is based on an annual growth of between 100 and 200 feet per acre. Of course to produce anything like the amount mentioned it will be necessary for the lumbermen to abandon the crude methods followed in the past and to cut the timber on a more scientific manner. We lumbermen have improved somewhat along this line already; that is to say, we are cutting the stumps lower and are working the tops up closer; much timber that was left in the woods to rot a few years ago is now being converted into lumber, but more of the young timber should be left stand on the ground and greater care should be exercised in felling the trees in order not to break down the young growth. It should be thoroughly understood that lumber in this country will shortly have to be sold on the basis of reproduction, and that means that prices of lumber in the future are to be higher, not lower. Timber and lumber are produced in Europe as a crop because conditions are such that such crops are profitable.

No laws or regulations can force forest owners to produce timber unless it is economically profitable to do so. We believe that it will be; we believe that within the next twenty years nearly all the high-grade hardwood will bring a third more than they are bringing today, and that oak crossties will be worth at least one dollar a piece. This country can be supplied with softwoods almost indefinitely from the Pacific Coast, from Canada and from the South, but the hardwoods most largely come from this Appalachian Mountain region.

Again referring to the subject of co-operation between a State Commission and private owners of timber lands we are of the opinion that the Commissioners could buy up such timber lands as are now not being looked after by the owners. For instance a great many tracts of timber have been cut over by lumbermen from other parts of the country and they have moved away. They do not, as a rule, attach much value to such cut-over lands, and for that reason would sell them cheaply. Another thing small parcels of land are frequently so situated that in order to protect them properly they should be grouped together, thus getting them into larger tracts. Individual land owners wishing to protect their timber could, in many cases, co-operate with

the State officials in fighting fires and reforesting.

We believe that some provision should be made with regard to taxing lands that are set aside for the purpose of reforesting. Such lands would be of great benefit to the public generally on account of protecting the watersheds, and for that reason the taxes should be light in order to encourage reforesting. Any lands purchased by the State would, of course, be exempt from taxation, and it would not be reasonable to suppose that individuals and companies could compete with the State in growing timber if heavily taxed. We do not believe that lands held by individuals or companies should be exempt from taxation, but in view of the great benefit to be derived by the public generally, the taxes should not be high.

It may be that this is not an opportune time to get much of an appropriation from the State for reforestry purposes, but we do believe that a small appropriation should be made, a commission appointed and the work started. If it shows to the people that there is going to be a future market for cut-over timber lands in this State they will naturally attach more value to their lands and give young timber better protection.

SAVING CHESTNUT TREES

By Roy G. Pierce

Tree Surgeon, Penna. Chestnut Tree Blight Commission

At Kennett Square, Chester County, Pennsylvania, an extensive experiment has been carried on by Mr. Pierre S. DuPont, in attempting to save his chestnut trees which had become infected with the chestnut blight. Many of the chestnut trees on the lawn were planted about 65 years ago. They now range in height from 70 to approximately 90 feet. In all about 70 trees including the lawn trees as well as some in the woodlot were treated for the blight. Some work consisting mostly of the removal of dead limbs and filling of cavities had been done prior to October, 1911, at which time Mr. R. E. Wheeler, a forester of several years' experience, was put in charge of the work. All of the chestnut trees were diseased at this time. Some trees were so badly diseased that they had to be cut down. Low stumps were cut, and the bark was peeled from the stump clear to the ground. The stumps were not burned or charred. The bark from the stumps, as well as the branches and the logs cut from the felled trees, were removed from the lawn. In October, 1911, under Mr. Wheeler's direction, the work of removing of all cankers that were

AN EXAMPLE OF TREE SURGERY ON YOUNG CHESTNUT TREE WHICH HAS BEEN INFECTED BY THE CHESTNUT BLIGHT.

POWER SPRAYER USED IN SPRAYING CHESTNUT TREES ON THE DU PONT ESTATE, KENNETH SQUARE, PENNSYLVANIA.

found in trunk and large branches, as well as the removal of small diseased branches and twigs, was begun. This was done with gouge, mallet, and saw and longhandled tree pruners.

In cutting out the cankers, the wounds were made to conform to the outline of the canker, rounded when the canker was round and elliptical when the canker was an ellipse. When necessary the wood was gouged out to the depth of a half inch beneath the canker. Healthy bark for about an inch outside of the fan-shaped mycelium was also removed. The wounds which have been found to heal best are those which have been pointed at top and bottom. With round cuts examination showed that the healing had taken place close to the sides of the cut but well beneath the bark at the top and bottom. This overlapping bark affords an excellent place for spores of fungi and for insects. The diseased bark and branches were collected and burned. The tools as well as the wounds which were made at this time, were washed with a fungicide consisting of bichloride of mercury (corrosive sublimate) solution 1 to 1000, that is, one part of bichloride of mercury to 1000 parts of water. After sterilizing the surface, the wounds were covered with a waterproofing consisting of pine tar, linseed oil, rosin and lampblack in the proportions of about 1 part of each of the first three, with just sufficient lampblack to give the desired color. This mixture does not seem to injure the cambium layer.

Only about one-third of the trees were gone over in 1911; these were east of the residence in the Park. In 1912, all of these chestnut trees were gone over thoroughly by Mr. Wheeler and his men. The trees east of the residence were examined and treated three times during the season, in May, September and November; and the scattering trees around the green house were gone over twice in the same period. The wounds where diseased

SPRAYING CHESTNUT TREES WITH BORDEAUX MIXTURE ON THE DU PONT ESTATE AT KENNETH SQUARE, PENNA.

spots had been removed, and where branches or stubs had been cut off, were examined carefully to see whether reinfection had taken place from outside, or whether the fungus had spread from the old infection.

Notes upon the results of cutting out lesions were made in December, 1912, and March, 1913, for 70 trees. There were 385 lesions cut out on these trees averaging about 7 lesions per tree. (This does not include any branches removed, or small twigs cut off.) In 70 cases there was spread of infection or reinfection around old wounds; 32 of these 70 were infections around old lesions which had been previously removed, and 38 were infections which appeared around base of old limbs which had been removed.

It cannot be said that all of these 32 cuts which were later infected were not successfully made, for it was quite apparent on examination, and Mr. Wheeler corroborates my findings, that more than 50% came in on the callous forming around the wound. This new growth which has fairly thin bark seems to be especially susceptible.

In 1912, the wounds and tools were not sterilized with bichloride of mercury, but the creosote in the wound-coating of pine tar, creosote and lampblack was depended on for sterilizing

the surface of the wound. Two parts of pine tar were used to one of creosote. Rosin was added for large wounds. The creosote kills the cambium to a slight extent, but this killing back of the cambium may be counterbalanced by the preservative effect of the creosote.

In the spring of 1912, a three horsepower Fitz-Henry Guptill "size B" sprayer was purchased. This sprayer was equipped with a 200 gallon tank and several hundred feet of hose. Beginning with April, some 70 trees were sprayed; those in the Park east of the residence about 20 times, at intervals varying from 10 to 14 days up to the middle of November. Others of the trees near the greenhouse were sprayed 14 times, and the trees in the woodlot from 2 to 8 times. Owing to the height of the trees it was necessary to climb into them and spray the adjoining ones, thus making it more expensive than if the trees could have been sprayed entirely from the ground. The preparation used at first was Bordeaux mixture of 5-5-50 strength, that is five pounds copper sulphate and five pounds of lime in fifty gallons of water. Since it was noticed that this burned the tender young leaves in the spring, one pound less of copper sulphate was used, making a formula of 4-5-50. The foliage was not injured by this latter mixture, but it has given the trees a bluish-white appearance which is objectionable to some. It is believed that this objection can be overcome by spraying with lime sulphur. Experiments with this spray are being conducted.

On trees which have been treated only twice and sprayed but two or three times, so many infections have been found that it was considered necessary to cut the trees down. However, there is no apparent difference between trees sprayed eight times and those fourteen to twenty times. It seems that the more frequently a tree is climbed, the more liable it is to be wounded by the heavy shoes worn by the men. A number of infections were traced directly to wounds made on thin bark by shoes.

The chestnut trees on the DuPont estate which were more or less infected by the blight in the fall of 1911, are now apparently as free from disease as can be had by frequent examinations for new infections and by the best methods of tree surgery. The trees have lost many twigs and large diseased branches, but even today they have relatively full crowns and present a good appearance. The spraying with Bordeaux mixture has not entirely prevented reinfection, but the facts indicate that it has lessened it considerably.

The great benefit of spraying has been that it has prevented much new infection. Trees given careful surgical treatment, but sprayed only once or twice or not at all, are quickly reinfected, and soon succumb to the disease. Even under the best methods of treatment and frequent spraying it has been very difficult to keep the disease under control.

Spraying with Bordeaux mixture can not be considered a cure for the chestnut blight. No spray can penetrate the bark and kill the fungus beneath the surface. The action of the spray in the case of the chestnut blight is that it prevents new infection from the exterior by killing spores with which it comes in contact.

41,150 *ACRES WITHDRAWN.*

One of the last official acts of President Taft was the signing of a proclamation eliminating 41,150 acres from the Kansas National Forest, Kansas.

The tract eliminated is in the extreme Western section of the Forest, and includes all that part which lies West of the Fifth Guide Meridian. It is principally a sandhill country and while it could be reforested, there is such a large proportion of alienated or privately owned land within the forest boundaries that the Government's reforestation work would have to be confined to more or less isolated areas. Since the area is valuable for grazing its restoration to the public domain was deemed advisable.

UTILIZING FOREST AND SAW MILL WASTE

By H. S. Sackett

Vice-President, Forest Products Company

DURING the past few years thousands of acres of spruce trees have been denuded to furnish paper for the printing of articles on "Conservation" and kindred subjects. Whether this, *per se,* has been practical conservation at all times is doubtful, for many papers have been prepared by conscientious and enthusiastic workers in the field, advocating measures of economy in the use of wood, which were not only impractical but often impossible of application. Such articles were not wholly useless, however, for they tended to keep the public mind on the subject and to bring out, even in their criticism, additional information and data of importance.

Most of the articles to which reference is made, invariably pointed out that the lumber industry was far behind in economical development when compared with other national industries such as mining, meat packing and steel manufacture. This is undedeniably true, but the reason for it is plainly evident and furthermore, a most natural one. In the case of the highly developed industries are found high costs of producing or securing the raw material, difficulties of manufacture, and keen competition in marketing; in other words, there has been, through natural and economic conditions, a strong necessity for an intensive development. With the lumber industry, however, such has not been the case. Here there has been no difficulty in producing or securing the raw material, for nature with her unlimited time and wealth has been slowly growing trees for centuries, not hidden and troublesome to secure as coal, silver and oil, but on the surface and easy of access, and furthermore, located almost providentially it would seem, in nearly every place that man has needed them. Manufacturing also has been relatively easy and inexpensive and competition in marketing, except among woods themselves, has been known only in recent times. Thus it is that the lumber industry has been so slow in developing and that it is so often pointed out as our best example of national extravagance and improvidence.

But these conditions are now changing, in fact some have changed and there is coming to pass in the lumber industry a new state of affairs. The first step in the new régime was brought about some time ago when the lumbermen and the public too suddenly realized that the end was in sight. This caused higher stumpage prices, and made the wood-user,—the one solely dependent on wood—look to other materials. Higher stumpage and increased cost of labor and supplies made higher selling prices and gave a strong foothold to wood substitutes,—which advantage was quickly seized. This was the lumberman's first set-back; it was the first time any outsider had entered his domain and he was temporarily at a loss to know what to do. His first impulse,—and a most natural one—was to make the most he could while the raw material lasted and he did this by taking the cream and leaving the milk. It caused greater "waste" in the woods than ever before —but it was nature's loss,—and cost nothing—so he figured. Then the tariff was cut and more "waste" was left in the woods. And then the lumberman awoke to the fact that the time had come to make something out of all this "waste,"—and the awakening was not due wholly to his regret at the loss, for he viewed this but apologetically—but to his constantly growing narrower margin of profit. Such is the state of mind of the lumberman today. They all realize that they must begin at once to utilize the forest and saw-mill waste, but, characteristic of their former prac-

THE USUAL FOREST WASTE WHICH OBTAINS IN THE SOUTHERN YELLOW PINE REGION.

tice, they are slow to investigate the possibilities of so doing. In this connection it is sincerely to be hoped that they won't wait too long, for if they do, outsiders are bound to come in and take from them a vast wealth that rightfully belongs to the lumberman.

For many years attempts have been made to utilize the forest and saw-mill waste. Most of the attempts have been on the "forest waste" in the manufacture of naval stores, and nearly all have been attended with a greater or less degree of success. With good prices they have flourished and under adverse conditions they have shut down. But in no instance up to the present time, however, has success attended the attempt to get all the products out of the forest waste by distillation and to elaborate it

THE FOREST WASTE WHICH OBTAINED AFTER WOOD SUBSTITUTES GOT A FOOTHOLD, AND AFTER THE TARIFF WAS CUT.

into a big and profitable business. Recent progress in the South, however, indicates that a great advance has been made along this line, and one company has just been organized to utilize this waste, which bids fair to attain the long-sought goal. The reasons for feeling that success is possible in this instance is that there is being applied to the business the methods developed and now employed by the meat packing industry, where every part of the animal is utilized for the manufacture of some product. If this method of procedure has made the meat packing business such a success, there is no reason why it should not also make the wood distillation industry a most profitable one.

In utilizing the saw-mill waste a great advance, also, has been made in recent

years. There are now operating in the South two large plants which are producing a high grade of ethyl alcohol from sawdust and other mill refuse. One has been running profitably for over a year and the other which has just started bids to be even more lucrative since, as might be expected, improvements in construction and operation have been made.

Several pulp and paper mills are being built and some have been in successful operation for a long time. Good grades of chemical pulp and certain grades of paper have been produced.

In the production of power, also, by the use of wood waste for making gas, much progress has been made and several such plants are now in operation.

With all this successful experimentation it seems as though it is no longer necessary for the lumberman to apologetically view his waste pile. Opportunities to profitably utilize it are offered and it is high time he took advantage of some of them. Which method he shall adopt depends on the products he desires to manufacture and the amount of money he wishes to invest. What he should do now is to *investigate*. The Forest Service will help him to do this, and so will a number of private concerns. And he had best do so this promptly, too, for a keen investing public is watching his waste pile and is keeping in touch with the attempts of commercial concerns to use it, and if his action isn't prompt, he will lose not only his "bacon" but his "board" as well.

ENDORSED BY LUMBERMEN

A VERY successful two-day session marked the annual meeting of the National Wholesale Lumber Dealers' Association at Atlantic City on March 6 and 7, there being an unusually large attendance, while the papers read and addresses delivered deserved the closest attention and consideration. Dr. Henry S. Drinker, president of the American Forestry Association and president of Lehigh University; S. B. Detwiler, of the Pennsylvania Chestnut Blight Association; John M. Rhodes, of the Forestry Committee; R. C. Lippincott, member of the advisory board of the American Forestry Association, and P. S. Ridsdale, secretary of the American Forestry Association, were among the speakers at the morning meeting devoted to forest subjects.

The resolutions passed included the following:

Resolved, That the National Wholesale Lumber Dealers' Association indorses the efforts of the American Forestry Association to secure better State and national fire protection for the forests; for protection from insects and disease and for reasonable taxation.

Resolved, That the members of this Association lend their support to the American Forestry Association and encourage subscription to its magazine, AMERICAN FORESTRY.

Resolved, That we believe it to be in the interest of all the people to retain and preserve the National Forests and that we oppose any attempt to deprive the nation of these forests as being against the best results to be obtained in forest conservation.

Be it further resolved, That we indorse the general recommendations and the work done by our Committee on Forestry, and that we hold (along with specialists of the American Forestry Association and Committee of the recent Conservation Congress), covering taxation; that conservative forest management and reforestation by private owners are very generally discouraged or prevented by our methods of forest taxation; and "we recommend State legislation to secure the most moderate taxation of forest land consistent with justice, and the taxation of the forest crop upon such land only when the crop is harvested and returns revenue wherewith to pay the tax."

BILTMORE AND PISGAH FORESTS

AN examination of the planted forest on the Biltmore estate and the natural forest growth on Mt. Pisgah was the chief feature of the spring meeting of the directors of the American Forestry Association held at Asheville, N. C., on March 25 and 26. Through the courtesy of Mr. George W. Vanderbilt, and under the direction of his superintendent, Mr. C. D. Beadle, the directors and their guests spent two days in most interesting and instructive examination of the forest conditions on the Biltmore estate and on Pisgah mountain, deriving much benefit from the study. Special interest was taken in overlooking the several tracts of planted forests, now under growth from five to twenty years on the Biltmore land, and originally set out under the supervision of Mr. Gifford Pinchot, J. Overton Price or Dr. C. A. Schenck, at different periods by varying methods and under different conditions, and all of these furnished material for investigation and study.

The weather conditions, rain and fog, prevented the detailed study which was desired of the natural growth on Mt. Pisgah, but despite the rain a great deal that was of much interest and benefit was seen.

The excellent care taken of the party by Mr. C. D. Beadle, chief engineer Waddell, and Dr. Wheeler, his assistants, and the manner in which they made the thorough examinations of the conditions possible, together with the provisions made for the comfort and the refreshment of the party were deeply appreciated and made the two days spent on the trip thoroughly enjoyed by all.

On the evening of Tuesday, March 25, a public meeting was held at the Langren Hotel, where the directors made their headquarters, and thanks to the assistance rendered by Secretary Buckner, of the Board of Trade, by J. S. Holmes, secretary of the State Forestry Association, and by officials of the Y. M. C. A., the Y. W. C. A., and various women's clubs, as well as of J. Baylis Rector, the manager of the hotel, there was a large attendence of people interested in forest conservation.

Dr. Henry S. Drinker, the president of the American Forestry Association, presided and made an address. Other addresses were made by Mr. J. S. Holmes, on forest conditions in North Carolina; by J. F. Rhodes, manager of the National Lumber Manufacturers' Association, on the relation of lumbermen to forestry; by Capt. J. B. White, of St. Louis, which appears on another page; by John Birkinbine, president of the Pennsylvania Forestry Association, upon the work his Association has done so well in Pennsylvania; by A. B. Farquhar, president of the Pennsylvania Conservation Association, on the rapid growth of forest conservation and its benefits to the country; by Dr. J. T. Rothrock, secretary of the Pennsylvania Forest Reservation Commission, on the effect of the forests upon the residents of forested countries; and by S. B. Elliott, of the same commission, upon the immediate need of practical replanting of the land available for it.

In the course of his address Dr. Drinker said:

"It is highly fitting that this American Forestry Association that aims to promote the support of forestry throughout the United States and to forward general and active interest in this most important phase of the Conservation movement which is now attracting the attention of thoughtful citizens all over our land, should meet in this home of Forestry, where so much has been done by way of experiment and steady work and care to practically demonstrate the great economic value of intelligent sustained forest culture. Asheville is, in itself, an inspiring place for a forestry meeting, for the people of this progressive community have given substantial proof of their interest by the recent endorse-

ment by the Asheville Board of Aldermen, the Board of Trade, and the Merchants' Association of Asheville of the forestry legislation introduced in the North Carolina Legislature.

"The passage of the Weeks' bill and the purchase of Appalachian Forest Land under it,—from New Hampshire to Georgia,—is naturally developing a community of interest,—an interstate forestry bond,—between the eastern states, highly conducive to increasing intelligent appreciation of forestry matters. As stated in Mr. Wm. L. Hall's paper on "The New Eastern National Forests" the recent favorable reports of the United States Geological Survey are of great importance in that they show that the relationship between forests and the flow of navigable streams, which Congress assumed to exist when it passed the Weeks' Law, does, in fact, exist, and that it is of great economic importance to the inland navigation interests of the country. This survey definitely fixes the acquisition and maintenance of National Forests on the watersheds of navigable streams, as a National responsibility, because the development and maintenance of the navigable streams is a duty of the Federal Government (and surely also of the several State Governments).

"Questions of vast importance to the present and future prosperity of our country are now before our people, and our National and State Legislatures. The National Legislature, after prolonged discussion, embracing several succeeding sessions of Congress, finally passed the Weeks' bill, Congress has continued to support by annual appropriations the maintenance, care, and extension of our National Forests, and no better tribute to this policy can be well formulated than that stated in the eloquent address of the Hon. John Lamb, of Virginia, Chairman of the Committee on Agriculture of the House of Representatives, given in January before the American Forestry Association and published in the March number of AMERICAN FORESTRY.

"The day has long passed when the love of forestry and its promotion can be looked on as a fad of the nature-loving theorist. Forestry is today recognized universally as a highly important economic movement in the United States and Canada. In Europe its public value has long been tried and recognized.

"Education in forestry is being given at many institutions throughout our country. There are twenty-three schools of forestry leading to a degree, attached to Universities or Colleges; ten schools with courses covering one or more years in forestry, and thirty-four schools with short courses in forestry.

"The State Universities in the West and State College and Lehigh University in Pennsylvania, are by public lectures and demonstrations spreading a knowledge of forestry among the people at large—and the various Forestry and Conservation Associations and allied organizations, East and West, North and South—are promoting and forwarding the good work. There are today in addition to the American Forestry Association, the Society of American Foresters, the National Conservation Association and the National Conservation Congress—National Organizations—not less than twenty-three State and Local Forestry Associations, and thirty-four Timber Protective and Fire Patrol Associations; also a number of Game Protective Clubs, Mountain Climbing Clubs, and Geographical Societies all intelligently and zealously co-operating in the study and forwarding of forestry interests.

"The compilations of the United States Forest Service (Office of State Co-operation) show that twenty-nine States in 1912 made appropriations ranging from $200 in Delaware and $500 in Alabama (for publications only), North Carolina $3,000 (for administration and publications), Louisiana $25,000 (collected from a license tax on the timber cut of the State and for fire protection only), Massachusetts $49,000 (administration and publications, fire protection, reforestation, and nurseries), Wisconsin, $95,000 (administration, fire protection and purchase of lands), up to $224,550 in New York for administration, fire protection, pur-

chase, maintenance and survey of land, and reforestation, and $321,750 in Pennsylvania (the highest figure), for fire protection, purchase of lands, and administration and protection of State Forest Reserves, and for the Forest Academy, with also a further special appropriation of $275,000 (to be available for expenditure for two years) for combating the chestnut blight disease.

"All the States have provided for criminal liability for causing fires, and practically all for civil liability, and many of the States have legislation relating to the Forest Protective Systems, Fire Fighting, Burning Brush, etc., and at least twenty make specific appropriations for fire protection.

"Thirty-four of the forty-eight States, over two-thirds, now have State Forestry Organizations of some kind, and measures looking to the substitution of some modern system of forestry taxation have been adopted or are under present consideration in a number of States—among them all the New England States, Ohio, Wisconsin, Louisiana, New York, and Pennsylvania.

"This is certainly an encouraging evidence of the existing and growing intelligent appreciation in the people of the land of the importance to the country of the study and promotion of forestry—and the public-spirited men and women who have had this great economic question at heart and have preached and taught it may well take encouragement at the increasing success of their patriotic labors."

Just before the meeting adjourned Dr. C. P. Ambler, a leading resident of the city, paid the following graceful tribute to the Association. He said:

"On behalf of Asheville, I think we should take this opportunity of thanking the American Forestry Association for the magnificent way in which it took up our fight for the then proposed Appalachian Forest Reserve. All present probably know that the Appalachian Forest Reserve movement was started here in Asheville, and that for five years we pushed our bill before Congress, getting the same through the House several times and through the Senate once, and our bill had favorable mention by two presidents, but we could never get both the Senate and the House to concur at the same session.

"Our fight looked hopeless until the American Forestry Association came forward and took the matter up and enlisted the assistance of the New England people. Without the assistance of the American Forestry Association, the bill would never be passed, and as one of those who did what he could in the beginning, and as representing the old association, formed here in Asheville, we want to welcome the American Forestry Association to Asheville and express our appreciation of what it has accomplished."

WESTERN HEMLOCK VALUABLE.

Western hemlock, says the Department of Agriculture, deserves a better opinion and more general use than it now obtains. Intrinsically it is among the most important of Western woods.

The wood of Western hemlock has generally been considered an inferior one chiefly because of the prejudice created by the name, which has caused it to be identified with Eastern hemlock. Tests by the Forest Service, however, show it to have 88 per cent the strength of Douglas fir, one of the country's chief construction timbers. In fact it is often mixed with Douglas fir and used for the same purposes.

FORESTERS BECOME NURSERYMEN.

Wm. H. Mast, who has been in the United States Forestry Service for thirteen years and W. J. Duppert, who has also been in the service but for the last two years was a professor of forestry at a Nebraska University, have purchased the stock and business of Nichols and Lorton, nurserymen of Davenport. Iowa. Mr. Mast conducted extensive nursery and planting work for the Forest Service for seven years, and Mr. Duppert is a professional landscape gardener.

LUMBERMEN AND CONSERVATION

By J. B. White

An address at the Spring meeting of the Directors of the American Forestry Association at Asheville and Biltmore, March 25, 1912.

MR. PRESIDENT, LADIES AND GENTLEMEN: I am not insensible to the great compliment paid me by Mr. Rhodes; I know it is truthfully meant, but is rather too generously said, because the speaker is prejudiced and prejudice always begets exaggeration. I, however, wish to say that all lumbermen appreciate Mr. Rhodes and the great work he is doing for us, and all agree that he is without a peer as an organizer of men on progressive plans for greater development.

When I came to Biltmore today I felt as if I was stepping upon holy ground, for here is the cradle of American Forestry, here is the early beginning, the oldest seat of learning for successful and practical forestry. Here is still the largest tract in acreage of successfully applied practical forestry methods in the United States, and in the distant future this place will be referred to and its philanthropic proprietor will be remembered as the pioneer forester and the pioneer forest plant of America. Here have taught and practiced those who were first educated in European forest schools, Pinchot, Schenck, Price and others. These names with many of their associates who are still with the Biltmore Forest, together with Mr. Vanderbilt who had the will, the faith and the means to make this great beginning a most promising success, will in the future of American forestry be remembered as its earliest and amongst its greatest pioneers.

The present was the future of the past; tomorrow is the future of today. Since mankind emerged into the state of higher development we have in many ways been constantly growing and practicing conservation by necessity from the pressure of our needs and according to our best understanding. Conservation is a great national principle. It should begin in the home and in the private life of every individual.

Improvements, new discoveries, and useful inventions come with the needs of the people. A nation, as with a community or its individual units, that lives within its own resources and develops and utilizes every possible by-product, and sells more than it buys, is bound to be prosperous. But if through neglect of cultivating and utilizing, conserving and economizing her own natural products, the balance of trade goes against her, so that she is forced to buy more than she sells; that nation is on the sure road to bankruptcy and the profits, which should go to her own labor, are paid out to the labor and industry of the more intelligent and thrifty country. Conservation of natural resources comes only when it is discovered where and how it will pay to conserve. Until then there is no inducement to save and develop, for the effort would result in loss.

In forestry, as long as one can buy trees far cheaper than he can grow them, those who have to live from the products of the soil, choose from necessity to grow such other crops that will bring the needed annual returns. But when some far-seeing individual begins to believe that the old forests are so rapidly disappearing that it will pay him to plant and cultivate trees, and he is situated so he can afford to wait for returns, or wishes to hand down a valuable legacy to his descendants, then he goes wisely to work under the most experienced economical methods, chooses that quality of soil best adapted to tree

growth and least adapted to other soil crops; and figures interest, taxes, fire and other risks, and makes out his probable cost and profit statement in advance.

Up to the present time, here in America, conditions have not been such as to make the experiment seem attractive to either laymen or to professional foresters who have the necessary capital. No one will risk, under present conditions, what Mr. Vanderbit has undertaken. Those who proclaim loudest fear to risk their own capital, but urge the lumberman to try it. Not one in this audience will undertake the expense. The lumber manufacturer, who has to buy his trees usually from five to ten years' supply, according to extent of his financial ability, hesitates, considers, and so far has concluded that he had rather sell the land from which he has removed the present merchantable timber to some one who is willing to undertake the work of reforestation as a source of profit. And such lands can be bought in any quantity at prices ranging from two to five dollars per acre.

Lumbering is usually considered as embracing, aside from transportation, the following distinct features: Logging, manufacturing, and merchandising. In many of the largest lumber plants, especially on the Pacific coast, the logger buys the timber from the timber investor or forest capitalist and cuts, delivers and sells the logs to the manufacturer. The manufacturer sorts the logs according to size, length and quality for purposes required, and saws them into lumber which is graded and classified as the wholesale market demands. It is then sold to the lumber merchant who, as wholesaler or jobber, considers the peculiar requirements of the different world's markets, the special features of particular markets, subdivides grades, figures freight, insurance and other expenses, and takes the attendant commercial risks. Few manufacturers are good loggers, and fewer still are good merchants. Yet there are many who have, with a fair measure of success, combined all three of these business qualifications and eliminated the wholesaler and jobber, and sold directly to the retailer, assuming the burdens of numerous specifications for different items differently manufactured for widely scattered local markets. This necessitates the carrying of large stocks of all grades and qualities, and no one, who has not acted in this threefold capacity, has any idea of the perplexing and annoying details. And he would not logically be the most effective and economical one to assume the fourth requirement of properly conserving and growing a commercial forest. This is a special feature requiring capital and a forest education.

The forest owner has a field peculiarly his own. He is not a lumberman, a cooper, a mine owner, a wine grower, or anything else but the grower of trees. But he sells certain species and sizes to the mill owner, to the cooper, to the mine owner, to the wine grower, and to the railroad for ties, and to the telegraph companies for poles, and for every purpose a market requires, and he is the one who will most successfully grow forests. He will as a forester love his work; and will be encouraged by the State by low taxation or total exemption for a period of years as is done in Europe, and will be able and satisfied to wait for results. By charging a low interest rate on his investment, he should get a profit that would pay as well as the average of other soil crops on similar land, or forestry would not prove financially desirable.

But future possibilities are somewhat shadowed by the future probabilities of wood substitutes. Witness the change wrought in the past ten years by the advent of steel, concrete and artificial lumber. Ten years ago hundreds of millions of feet of fencing were annually sold by the lumber manufacturer, now wire has taken its place. Ten years ago, it took hundreds of millions of feet every year to keep up the sidewalks of the United States and hundreds of millions of feet more for the bridges of the country; now cement and concrete have taken the entire business. Steel and concrete structures are being erected in every city; and homes in city, village, and country are being built

of concrete. Twelve years ago only nine million barrels of cement were sold in the United States. Last year about one hundred million barrels were sold. I know of a great many lumber yards where the auditors' reports show sales of cement averaging one car to every four of lumber. I am interested in a saw mill in Shannon County, Missouri, where I am selling good lumber at an average of $14.00 a thousand feet. Yet within two miles on one side of me is a concrete church, a concrete school house, and a ten-room concrete farm house. And on the other side, a mile and a half from the mill at the town of Eminence, is a concrete hotel, a concrete union school building, two concrete banks, and two concrete stores. This innovation of substitutes is found all around in other States. And the irony of it is in the very fact of many manufacturers themselves in the lumber States building steel and concrete saw and planing mills, dry kilns, and other buildings. Fibre boxes are already displacing hundreds of millions of feet of lumber annually. Artificial lumber is now being made from wood pulp, jute and straw. Experiments show that one ton of this fibre pulp makes eleven hundred feet of inch lumber. I understand there are many large industries making these substitutes.

So conservation is coming and is even now at hand. We do not know how far it will affect lumber values, but it will have a great influence, and may result sooner or later in every large saw mill having a pulp mill for utilizing all waste, including limbs, tops, and stumps, and stills for extracting and saving all by-products. Several mills are now selling their waste for this purpose, notably the Great Southern Lumber Company, and Mr. Fullerton's mills in Louisiana. Besides there are two paper mills in that State using pulp made from pine waste. These changes mark an epoch in progress, and these savings will more than double the yield of commercial wood per acre, and insure building material for this and future generations that will not shrink, warp or check. As straw and jute from the farm enter quite as largely into this artificial board as the wood pulp, the farmer and the lumberman will join hands in the furnishing of building material in competition with concrete and other substitutes. This is no idle dream. The time is here, and these evidences of progress have come to stay, and may likely prove to be harbingers of greater developments to come.

It will be found true in this country that the growing of trees is one industry, and the manufacturing of lumber another, and its merchandising quite another. Yet there will be instances, as there are in Europe, where all these features will be combined in one individual. But commercially, the greatest success comes from specializing, and recognizing that each process requires special adaptability, and that no one man can be equally sucessful in all things. This is and will continue to be necessary for the best conservation and the greatest development.

PRIVATE AGENCIES DOING THE WORK.

Because of the extent to which private agencies are now collecting lumber price data, the Secretary of Agriculture has decided to discontinue publication by the Forest Service of its quarterly issue of mill and wholesale lumber prices.

FOREST COMMITTEE INVESTIGATIONS

THE special forestry committee appointed by President Charles Lathrop Pack, of the National Conservation Congress, nad financed by the American Forestry Association, for the purpose of investigating subjects of vital interest to foresters, lumbermen and timberland owners, has now outlined a course of investigative work and is busily selecting sub-committees to be devoted to securing information upon specific subjects.

AMERICAN FORESTRY has placed its columns at the disposal of this special forestry committee and will officially furnish information of what the committee is doing during the progress of the investigations. .

The following statement by Mr. E. A. Sterling, the secretary of the Forestry Committee, tells of the situation to date:

The foresters and lumbermen in attendance at the Fourth National Conservation Congress at Indianapolis last year held several informal sectional meetings. Out of these grew a plan for promoting intelligent public sentiment regarding forestry and lumbering, and for collecting, compiling, and disseminating authoritative data and general information on subjects of broad interest. After various conferences during and after the Indianapolis meeting the two fundamental handicaps of responsibility and finance were disposed of.

The first essential of providing a representative organization to be responsible for the work, has been provided for by President Charles Lathrop Pack offering the endorsement and facilities of the National Conservation Congress, and constituting the regular forestry committee of the Congress a body to direct and correlate the work of sub-committees. To these standing committees, which are broadly representative, will be delegated the work of collecting reliable information on the subject assigned, and of working it up into concrete reports. The Forestry Committee of the Congress will receive and pass on all sub-committee reports, and also from them select papers for the general sessions of the next Conservation Congress. Important reports involving broad questions of policy will be brought before the Forestry Section of the Congress for endorsement, and after acceptance given publicity through various channels.

The second essential of finance has been liberally provided for by a special fund donated by the American Forestry Association for the use of the Committee, part of it coming from personal contributions of public-spirited members. The American Forestry Association also offers its magazine and influence in giving publicity to the Committee's findings.

The Forestry Committee of the Congress as appointed by President Pack, consists of Henry S. Graves, Chairman, J. B. White, E. T. Allen, W. R. Brown, and E. A. Sterling. The last-named will act as Secretary of the Committee in order to relieve the Chairman of details and follow up the work of the sub-committees.

The sub-committees are made up of men representing the best knowledge on each subject assigned. Their work will be outlined definitely to avoid repetition of endeavor, and directed and correlated by the Forestry Committee. The sub-committee subjects are as follows:

Committee 1, Publicity.
Committee 2, Federal Forest Policy.
Committee 3, State Forest Policy.
Committee 4, Forest Taxation.
Committee 5, Forest Fires.
Committee 6, Lumbering.
Committee 7, Forest Planting.
Committee 8, Forest Utilization.
Committee 9, Forest School Education.
Committee 10, Forest Investigations.

MR. PACK ON CONSERVATION

A LARGELY attended meeting of the Executive Committee of the National Conservation Congress met in Washington on March 19 to consider various matters of importance.

"Conservation must convey no suggestion of retarding honest development on fair terms," said Charles Lathrop Pack, of Lakewood, New Jersey, President of the National Conservation Congress, when at the Willard Hotel after the Committee adjourned. "Conservation does not mean reservation. It means the best use of our resources with a fair regard to the present and the future. It means to my mind production, prosperity and progress." Mr. Pack said he was moved to make these statements by the misleading reports he had heard recently as to the alleged purposes and aims of the Conservation Congress.

"Conservation is in danger of getting in bad," he continued, "if the erroneous impression should gain ground that the Conservation Congress stands for that which means the closing of any avenue for the honest economic development of public or private natural resources. Conservation in the false raiment with which its enemies would clothe it, that amounts only to reservation and disuse, is in danger of doing greater harm to the present occupants of this fair land of ours than it will do good to those who occupy it after we are gone. Conservation must mean development but only on fair terms if we are to progress. Rational Conservation as an economic question which means the fullest use of the natural resources in such manner as to give the people of today their chance and posterity its chance, on equitable terms, will, I believe, be the key-note of this year's Conservation Congress. On that basis we expect to get together and go ahead on some practical plan for the constructive conservation of our forests, waters and lands. We hope to be of some practical aid in solving these difficult problems. The time has certainly gone by for simply criticizing that which is bad without proposing helpful remedies."

TREES TO AID RECLAMATION

IN developing the plans for the West extension of the Umatilla reclamation project, the National Reclamation Service has adopted a new feature in work of this character. This is the planting and maintenance by the Forestry Department of strips of forest trees throughout the extension at intervals of about every half mile. The strips will be 200 to 400 feet wide, and their total length will be approximately 150 miles.

The purpose of this new departure is to supply fuel and fencing for the future settlers on the land and to protect the sandy soil from the winds that blow up the Columbia River. The strips of trees will extend North and South, except along the two sides, where the direction will be East and West for nearly forty miles. They will be planted on the highest lines, along which are to flow the canals and laterals of the irrigation system. Roadways will have space between the rows of trees.

The Forestry Department will plant and care for the trees. When they are large enough for useful purposes, they will be sold at nominal prices to the neighboring land owners. Persons holding private lands in the extension have signed windbreak agreements, giving the Government an easement on their lands, where necessary to plant trees, and on the public lands, which compose the larger part of the new project, the Government retains control to do this work.

PAYETTE RIVER TIMBER SALE

THE Forest Service is advertising for sale two large tracts of timber aggregating 750 million feet on the Payette River within the Boise and Payette National Forests. The timber is being placed on sale as a result of an application to purchase, made by an eastern lumber company, which has had representatives look over the timber on the ground. This company has under consideration the operation of a large mill at a point on the Payette River and the manufacture of from 25 to 50 million feet of lumber annually.

Under the law, the Forest Service is required to advertise for a period of not less than 30 days timber to be sold in amounts of more than $100 in value, but it is the policy of the Forester in selling large amounts of timber to advertise for periods of from 60 to 120 days. The object of the longer advertisements is to give the scales full publicity and to allow interested parties to make field examinations, to the end that as much competition as possible may be obtained. The Payette River timber is to be advertised for three and one-half months or until June 1, when the bids will be opened by the District Forester at Ogden, Utah, and the sale or sales awarded to highest bidders. Bids are to be invited on all or any portion of each tract advertised, thus giving small operators an opportunity to buy in amounts which they can handle.

The Payette River Timber is to be sold in two tracts, one on the South Fork of the river, estimated to cut 300,000,000 feet of yellow pine and Douglas fir; the other on the Middle Fork, estimated to cut approximately 450,000,000 feet of yellow pine, Douglas fir and spruce. The timber is mature, and the foresters say it should be cut in order to allow the young timber, of which there is a great deal, a chance to grow and produce another cutting within 30 or 50 years. The minimum rates at which it is to be advertised are $2.50 per thousand feet for yellow pine and $1.00 per thousand feet for fir on the South Fork, and $2.00 per thousand feet for yellow pine and $1.00 per thousand feet for other species on the Middle Fork. Contract periods of from 5 to 15 years will be allowed for the removal of the timber, depending upon the amount purchased.

If both tracts are sold, Forest Service officials say, from 35 to 50 million feet of timber will be logged annually for twenty years from the region. The market value of the manufactured product will be about $18 per thousand feet, or from $630,000 to $900,000 for the amount produced annually. This amount of timber produced locally, it is pointed out, will be of immense benefit to the southeastern portion of Idaho, since at the present time most of the lumber used is shipped in from the coast and eastern Oregon. The local manufacture of from 35 to 50 million feet annually will retain within the State a considerable portion of the money now leaving it in payment for imported lumber. It will further furnish considerable employment in the woods and mills.

Since 25% of the receipts from the National Forests go to the State for schools and roads, and 10% to the construction of roads within the National Forests, a further benefit will be derived locally from these sales. Forest Service officials handling the sale say that they expect quite a number of bids since several other eastern lumber companies have expressed much interest in the timber and a desire to look it over.

A FOUR MONTHS' SURVEYING TRIP.

James W. Sewall, timber estimator, of Old Town, Maine, has returned home from a four months' exploring and surveying trip in the Adirondack Mountains of New York State.

FOREST FIRE LOSSES REDUCED

THE Department of Agriculture has been figuring up the losses by fires on the National Forests for the calendar year 1912, and finds that they were the lowest of recent years. Less than one acre to every thousand of timbered lands was burned over, and the total damage is estimated at $75,290, or less than one dollar to every 2,000 acres of area.

The good record is attributed to, first, favorable weather conditions in most localities, and second, the increased efficiency of the fire-fighting organization. As Congress makes available the means for extending the system of communications on the National Forests, the equipment of trails, roads, telephones, and lookout stations is yearly enlarged and the fires, it is said, are discovered more quickly and fought more rapidly.

An especially good showing was made by the forest officers last year in extinguishing fires outside the National Forests before they reached the forest boundaries. Such fires constituted more than one-sixth of all fought by the forest rangers and guards. About nine-tenths were extinguished before they touched the forests. Of the fires within the forest boundaries more than 18 per cent were on lands in private ownership. Nearly one-fourth of the extra expenditures due to fighting fires—that is, expenditures outside the time of the regular forest force—was incurred in fighting these fires.

Lightning caused more fires than any other agency, followed by railroads, campers, and incendiaries, in the order given. The greatest losses occurred in Arizona, Arkansas, and California, in which States there was also the largest proportion of fires caused by lightning and by incendiarism. About 27 per cent of all the fires were started by lightning, and about 38 per cent were due to carelessness. The proportion in each case was practically the same as in the previous year.

The total number of fires was 2,472, as compared with 3,369 in 1911. They burned over, in the aggregate, 230,000 acres as against 780,000 in 1911. California led all States in total number of fires, and in the number caused by lightning. Arizona stood second in both of these classifications. Arkansas stood fourth in total number of fires, and first in those of incendiary origin, with California second. The one National Forest in Kansas had only one fire, which burned over less than ten acres and cost $1.11 to extinguish. North Dakota had no fires on its one small forest.

Of the 2,472 fires, over 75 per cent were put out before 10 acres were burned over, and nearly 50 per cent before one-quarter of an acre was covered. Only 12 fires caused damage of more than $1,000 each.

NATIONAL FOREST TIMBER SALES

THE Forest Service is now considering the sale of several hundred million feet of timber in Alaska to two different operators who contemplate installing paper and pulp mills in that territory. The species included are very largely spruce and hemlock. If the purchase matures these will be the first pulp and paper mills in Alaska.

In February the largest sale of Douglas fir in District 6 was approved by the Forester. The sale was made to the U. S. Logging Co., of Cottage Grove, Oregon, and is for approximately 163 million feet, upon the Umpqua National Forest. The contract allows 10 years for the removal of the timber and provides for two readjustments of prices. The initial price is $1.25 per thousand for Douglas fir, western red cedar and sugar pine, and 50 cents per thousand for western hemlock.

EDITORIAL

CHIEF FORESTER UNDER CIVIL SERVICE

THE announcement recently made that the office of the chief forester is to be put under the Civil Service was received with general approval throughout the entire country. It has long been recognized by broad-minded men that the people are best served by experts who have made a life study of their particular work, and as the chief forester must needs be a scientifically trained forester as well as a man of great executive ability, it is apparent that his appointment cannot well be a return for favors rendered any political party or candidate. To best serve the interests of the country he must be above political consideration. The decision of the new administration in this respect makes it evident that Chief Forester Henry S. Graves, who has so well conducted the great business of the department for the past few years, will remain at the head of it, a fact which will please foresters, lumbermen, timber land owners and conservationists all over the country.

It is expected that all the heads of the scientific departments of the government will within a short time be included in the Civil Service list, it evidently being the belief of President Wilson and his cabinet that men who are now proving themselves capable and efficient as heads of such departments should be placed beyond the danger of displacement for merely political purposes.

SECRETARY OF AGRICULTURE HOUSTON

SECRETARY OF AGRICULTURE HOUSTON is taking a deep interest in the work of the Forest Service and has rapidly acquired a very comprehensive knowl- of the game wardens. The new law is mod- work it has done in the past and what is considered best to do in the future. While Secretary Houston has made no statement of his opinion of forest conditions and of what the Forest Service is doing, it is generally understood that he is in entire harmony with the plan of work, and that under his direction it will proceed in much the same manner that it has done in the past.

Secretary Houston was much interested in forestry long before any one thought of him as a member of the cabinet. Forestry was taught in some of the schools over which he has presided, and he is generally looked upon as a thoroughly progressive conservationist.

SECRETARY LANE'S POSITION

SECRETARY OF THE INTERIOR LANE has definitely outlined his position in regard to insuring the highest utilization of public land resources. The Secretary recently received through Senator Poindexter a telegram from a State senator stating that the legislature of Washington had unanimously passed an act reserving all waters in the Wenatchee basin but that before the act was signed by the governor certain power interests had filed on these waters, and urging the President and the Secretary of the Interior to serve the best interests of the State of Washington by maintaining intact President Taft's Executive order withdrawing the 18,553 acres of reservoir sites involved. Both this Federal withdrawal and the State reservation were made with a view to possible utilization of the water for the irrigation of 290,000 acres in the Quincy Valley, on the east side of Columbia River, which, as stated in the telegram to Senator Poindexter, "means millions to the State of Washington and further development of Quincy Valley."

The Secretary's letter to Senator Poindexter points out clearly that he has no intention of revoking the order of withdrawal of the public land. He states:

"This action by the Federal Government was initiated in response to the request of citizens of your State, and in view of the recent action of the Washington legislature reserving all waters in the Wenatchee watershed it illustrates the type of co-operation between State and Nation necessary to promote the highest utilization and development. You may be assured, therefore, that no revocation of this Executive withdrawal will be recommended without first affording full opportunity for the presentation of the views of your constituents and for the complete investigation of the possible uses of this river."

FLOODS AND FOREST COVER

THE recent dreadful floods in the Middle West, causing a pitiful loss of life and vast damage to property, have called attention again to the value of the forests as safeguards against such calamities. While the floods cannot be said to be due to denuded forest areas in the Middle West, because it is largely an agricultural country, it is true that if this section had been well covered with forests the floods could not have attained the destructive force which they did. Too many people unfortunately overlook the fact that the forests, to a considerable extent, regulate the stream flow. Formerly well wooded sections of the country, where years ago while the forests were still standing, floods were never known, are now yearly swept by high waters and floods because the land has been denuded of its forests and nature has no means to check or retain in the soil, the heavy spring rains. The water accordingly quickly reaches the smaller streams, they are flooded and the high waters sweep on to swell the volume of the rivers, and often flood damages of wide extent are the result.

It is the duty of every individual land owner, every municipality, every State and the national government to do what can properly be done to encourage tree growth on denuded areas, to prevent the needless wholesale destruction of forests, to guard against the erosion of the hillsides and to prevent the land along the small streams and the rivers being washed away. Fair taxation of timber lands, fire protection, scientific lumbering, replanting and reforestation are all necessary before such encouragement will become wholly adequate.

SOCIETY FOR THE ADVANCEMENT OF FOREST ENTOMOLOGY IN AMERICA

AN organization to be known as the Society for the Advancement of Forest Entomology in America was effected at a meeting held at Washington, D. C., on March 1, 1913, with A. D. Hopkins, T. E. Snyder, S. A. Rohwer, F. C. Craighead, C. T. Greene, and W. S. Fisher, of Washington, D. C.; H. E. Burke and J. M. Miller, of Placerville, Cal.; Josef Brunner, of Missoula, Mont., and W. D. Edmonston, of Ashland, Oregon, as charter members.

The object of this society is to promote a more general interest in the subject of forest entomology and the protection of forest resources from avoidable waste due to the depredations of insects. Membership is open to persons who manifest an interest in the subject of insects in their relation to the forest resources and the forest products of North America, providing that they are recommended by a member or a responsible person.

The following officers were elected:

President, A. D. Hopkins; vice president, H. E. Burke; recording secretary, T. E. Snyder; corresponding secretary-treasurer, F. C. Craighead, room 410, Evening Star Building, Washington, D. C.

Annual meetings will be held at which the economic side of forest entomology will be discussed, including the reading of papers on the conservation of forest resources. It is intended to publish proceedings when the society becomes established on a sufficiently extensive basis. In the meantime papers and discussions of general interest will be presented for publication to forestry, entomological, and timber journals.

At the conference of investigators and specialists of the Branch of Forest Insects of the Bureau of Entomology, U. S. Department of Agriculture, held at Washington, D. C., February 26 to March 1, the following subjects were discussed: Methods of conducting investigations in the field and laboratories; methods of disseminating information based on the results of investigations, including popular and technical publications, correspondence, etc.; field demonstrations and instructions on the practical details of controlling and preventing depredations by tree-killing and wood-destroying insects; methods of promoting the science and practice of forest entomology; the services already rendered by the Branch of Forest Insects, the services to be rendered in the future, and the relation of the branch to other branches of the public service and to private interests.

In the discussion of results so far attained it was shown that information on the habits and life history of the Dendroctonus beetles (a group of the most destructive insect enemies of living timber of North America) has been determined, and that the practicability of the methods recommended for their control and the prevention of their ravages has been proven by a large number of successful demonstrations conducted during the past six years in cooperation with private owners, the Forest Service, and the Department of the Interior. It was also shown that the published information on the relation of insects to North American forests covers a wide field, both in the line of general information on the entire subject and specific information on the more important insects and problems. It was estimated that a general application of the information already determined and disseminated would save tens of millions of dollars annually to national and private interests in the prevention of waste of forest resources and manufactured crude and finished forest products. It was also shown that the results of original investigations, as published in the technical series of bulletins of the bureau, have secured for the Branch of Forest Insects favorable recognition and comment among entomologists of this and other countries. In the discussion of the interest manifested it was stated that twenty years ago there was practically no interest in the subject, and the idea of any practical means of controlling the depredations of insects in North American forests was not only foreign to the thoughts of foresters and private owners, but any suggestion of such a thing was ridiculed. At present there are probably no forest officials who do not know something about the importance of forest insects and the need of protection from their ravages, and the private owners of forests and the public are beginning to take an active interest in the subject, especially in sections of the country where any attention is given to forest conservation.

In discussing the services to be rendered in the future it was concluded that the greatest present need is in the line of further systematic and economic investigations of the more important injurious and beneficial species and the orders, families, and genera of insects which are represented by species of economic importance, and that specialization by experts should be a primary feature in the policy of the Branch, as applied to systematic and economic investigations and practical details in application.

Following the discussion of the relations of the Branch of Forest Insects to other branches of the public service and to private interests, it was agreed

that it is that of the scientific investigator and technical advisor on insect foes and friends of the forests and on methods of preventing unnecessary waste of forest resources. It was shown that a representative of the Branch rendering assistance to another branch of the public service—Federal or State—or to private interests—organized or individual, great or small, does so with the idea of rendering a public service through the results of practical application by the beneficiary. Therefore, no direct assistance should be required of such a representative unless there is assurance from the beneficiary that there will be an equivalent return in results which will further the interests of the nation, the State, or a community of local interests.

The present organization of the Branch of Forest Insects, with Dr. Hopkins Chief of Branch, includes four field stations: Station 1 at Missoula, Mont., for Montana, Northern Idaho, Wyoming, Colorado, and South Dakota, with Josef Brunner in charge; Station 5, at Placerville, Cal., for California, Nevada, Arizona, and New Mexico, with H. E. Burke in charge; Station 6, at Ashland, Oregon, for Oregon, Washington, Utah, and Southern Idaho, with W. D. Edmonston in charge; and Station 8 at Falls Church, Va., for the Eastern States, with S. A. Rohwer in charge. These stations do not represent administrative divisions but are centers for the investigation of local problems and for the conducting of instruction and control projects. In addition to the force of three to five men at each station, there is a staff of specialists at Washington engaged in the systematic investigation of the more important orders of insects and special subjects, as follows: Scolytid beetles, A. D. Hopkins; Forest Hymenoptera, S. A. Rohwer; Forest Lepidoptera, August Busck; Forest Coleoptera (general), W. S. Fisher; Forest Diptera, C. T. Greene; Forest Isoptera, T. E. Snyder; Cerambycid larvae, F. C. Craighead; and Buprestid larvae, H. E. Burke.

Some of the special field investigations now under way are the investigation of chestnut insects and their relation to the chestnut bark disease, general; insect damage to telegraph and telephone poles, posts, mine props, etc., by T. E. Snyder; relation of lightning and insects to the death of trees, by W. D. Edmonston; damage to fire and insect-killed timber by wood-boring insects, by B. T. Harvey; damage to forest tree seeds by insects, by J. M. Miller; damage to reproduction pine by tip moths and pitch worms, by Josef Brunner; the relation of mistletoe and witches broom on living trees to attack by insects, by H. E. Burke.

Experiments are under way to determine the relative immunity of different untreated and treated woods from damage by termites, by T. E. Snyder, and experiments are planned to determine the smallest percentage of an infestation to be disposed of to insure the control of the depredations by the various species of Dendroctonus beetles.

THE RELATION OF THE NATIONAL FORESTS TO THE WATER RESOURCES OF NEW MEXICO

By A. C. RINGLAND, *District Forester, U. S. Forest Service*

MANY papers have been written of late upon the influence of a forest cover upon the water supply of the region in which the forests lie. One of the best of these is an exhaustive report upon "Forest and Water in the Light of Scientific Investigation," published in the Final Report of the National Waterways Commission, Senate Document 469, by Mr. Raphael Zon, Chief of Silvics, United States Forest Service. This report, which brings together impartially all the well-established facts in regard to the relation of forests to the water supply, shows conclusively that

forests in mountainous countries, irrespective of species, save a greater amount of precipitation for streamflow and increase underground storage of water to a larger extent than does any other vegetative cover similarly situated. Furthermore, the forests by breaking the violence of rain, retarding the melting of snow, increasing the absorptive capacity of the soil cover, preventing erosion, and checking surface run-off in general increase underground seepage, and so tend to maintain a steady flow of water in streams. Of all vegetative covers, forests are most efficient in preventing the slopes from eroding and the beds of streams from filling with silt. Even on very permeable soils, where their effect upon the underground storage of water may be of secondary importance, they are necessary as protection against erosion.

In view of these facts, it is of interest to note the extent to which the irrigation interests of New Mexico are bound up with the protection and perpetuation of the forest cover. In an illuminating address delivered at the Mountain Air Chautauqua in July, 1911, Mr. Charles Miller, Territorial Engineer, summarizing the irrigation resources of New Mexico, showed that even from an ultra-conservative standpoint the possible irrigated area of the new State may be estimated at 4,000,000 acres, with an estimated annual water supply of over 5,000,000 acre feet. The estimated acreage susceptible of irrigation is divided between land now irrigated, surface supply, pumping area, and artesian wells. Important pumping areas are the Mimbres Valley, the Portales Valley, Estancia Valley, Alamogordo Valley, and the Bernalillo-Albuquerque-Belen Valley. The area of artesian wells, as at present located, lies in the lower Pecos Valley from Roswell to Artesia. The area susceptible of irrigation from the surface supply is tributary largely to the Valleys of the Arimas, Canadian, Gila, Rio Grande, Mimbres, Pecos, San Francisco, and San Juan streams. These streams comprise the most important in New Mexico. Almost without exception, their headwaters and, without exception, the headwaters of their tributaries lie within the boundaries of various National Forests. The streams and the forests in which they lie are as follows:

PECOS RIVER AND TRIBUTARIES.

Pecos National Forest (Mora, San Miguel, Santa Fe, Rio Arriba and Taos Counties)—Rio Pecos, Bernal Creek, Rio Tecolote, Gallinas Creek.

Lincoln National Forest (Lincoln County)—Rio Ruidoso, Rio Bonito, Hondo River.

Alamo National Forest (Otero and Eddy Counties)—Rio Penasco, Elk Cañon, Felix River, Blue Water Creek, Four-Mile Creek, Big Box Creek, Indian Creek, Lost Chance Creek.

CANADIAN RIVER AND TRIBUTARIES.

Pecos National Forest — Sapello River, Cebollo Creek.

RIO GRANDE AND TRIBUTARIES.

Pecos National Forest—Rio Galisteo, Santa Fe River, Nambe Creek, Nedis Creek, Rio Chiquito, Rio del Pueblo.

Carson National Forest (Rio Arriba and Taos Counties)—White River, Rio Taos, Rio Pueblo, Arroyo Hondo, Rio San Cristobal, Rio Colorado, Cubresto Creek, Rio Caliente, Rio Vallecito, El Rito, Rio Chama, Rio San Antonio, Rio Nutrioso.

Jemez National Forest (Sandoval County)—Rio Grande, Rio Chama, Gallinas River, Rio Puerco, Coyote Cañon, Frijole Cañon, Alamos Cañon, Rio Cebollo, Cochiti Cañon, Rio de la Vaca.

Manzano National Forest (Bernalillo County)—Tijeras Cañon, Alamillo Creek.

Zuni National Forest (McKinley and Valencia Counties) — Miguel Creek, Cottonwood Creek, Blue Water Creek.

Datil National Forest (Socorro County)—Salado River, San Lorenzo Creek, Water Cañon, Walnut Creek, Nogal Creek, San Jose Arroyo, Alamoso River, Negro River.

Gila National Forest (Grant and Sierra Counties)—Mimbres River.

Alamo National Forest (Otero and Eddy Counties)—Sacramento River, Rio Tulerosa.

COLORADO RIVER AND TRIBUTARIES.

Carson National Forest—San Juan Jaraloso Creek, Campanero Creek.

Zuni National Forest—Zuni River, Rio Puerco, Black Creek, Defiance Creek.

GILA RIVER AND TRIBUTARIES.

Datil National Forest—Tulerosa River, San Francisco River, South Fork of Gila River.

Gila National Forest (Grant and Sierra Counties)—San Francisco River, Mogollon Creek, Sapello Creek, Gila River.

BOOK REVIEWS

Simon B. Elliott's recently published book, "The Important Timber Trees of the United States," is a compendium of practical information of interest to every one who wants to know the simple facts concerning the condition and misuse of American forests, what of our trees are commercially useful, and how depleted forests can be restocked and maintained by conservative use. There is a particularly large audience of lay people—farmers and other practical business men who own and use timber lands and woodslands—to whom this book is sure to be helpful. The author systematically divides his subject into two parts, the first dealing with the essentials of practical forestry, and the second with the characteristics and uses of our most important timber trees. Three hundred and forty-two excellent half-tones pointedly illustrate the nineteen chapters and other sections which deal with these subjects. To information drawn from many different sources the author has added that which he has gathered in a lifetime of practical work in the woods and later in promoting public interest in forestry. The book combines not only a desirable view of the general principles underlying the application of the art of forestry, but also the equally essential details of actual practice. All of the topics are discussed in a simple, clear style, purposely with no attempt at technical consideration. In this the author has done a real service to the great mass of practical readers, who want to know how to help themselves. G. B. S.

Forest Service Investigations

The Forest Service has recently undertaken the publication of an entirely new series of bulletins, which should prove of great interest and value to all those engaged in forest research work. Volume I of the Review of Forest Service Investigations, which was published on March 11, 1913, calls attention to the great growth in the investigative work of the Forest Service within the last few years, and points out the need for some medium in which can be published progress reports on major investigations and final reports on minor investigations which in themselves are not of broad enough scope or sufficiently conclusive to warrant separate publications. The prime object of the series is to keep all of the men engaged upon investigative work in touch with each other and give them the fresh results of each study as it develops. While the Review will be of interest and benefit primarily to investigators in the Forest Service in all lines of work, it will, at the same time, prove useful to foresters in general and will serve as an index of the investigative work being conducted throughout the country. In addition to Forest Service investigations, material furnished by State foresters and forest schools will also be published from time to time. The first issue of the Review takes up thoroughly the organization and scope of the investigative work in all branches of the Forest Service, and includes a complete statement of the investigative projects approved for the year 1912. Some idea of the amount of work of this character now being undertaken by the Forest Service can be gained from the fact that this list, which includes merely the title of the project and a brief statement of its objects, covers 24 printed pages. The projects are all grouped under the four main heads of dendrology, grazing, products, and silviculture, each with a number of subheads. Future issues of the Review will include reports of results actually accomplished on the various projects under investigation.

This new series of publications undoubtedly fills a need which has been felt for some time by all those who are engaged in investigative work, and can not fail to be of assistance to them. S. T. D.

STATE NEWS

Ohio

The attitude of certain cities in Ohio toward the forestry movement has been very encouraging in the development of city forest parks. Three cities in the State have already taken up the work. Cincinnati leads in the work. The scheme there provides for a continuous tract of 2,000 acres. Part of the land is already in possession of the city. Options have been received on other portions, and eventually the entire area will be taken over.

Two other cities have taken up the matter with the State Forester, and already have acquired areas which can be devoted to such purposes. It is the plan of the Forester to devote the smaller tracts to forest arboretums, modifying the plantings to suit conditions. The aesthetic will be considered, but it will be subordinate to the main object. In this way it is hoped to demonstrate that parks and areas may be made beautiful and yet serve a useful purpose. Forest arboretums will be of untold value to the people when they commence seriously to undertake forestry operations.

Michigan

The Michigan Forestry Association has drafted two bills which have been introduced in the legislature and which are now pending. One contemplates a modification of the Public Domain Commission, which now has charge of State lands and forestry work, in such wise as to take it out of partisan politics; the other would create a strong basic law and policy for the handling of the State lands under a real State Forester, who would also have charge of the forest fire organization in the State—now in the hands of the game warden. The new law is modeled very closely after the Minnesota law and differs from it only in that it is made even stronger.

The association has distributed copies of a statement and petition to the governor, and it is understood that several thousand, each with many names, have been sent to the governor and by him referred to the proper committee.

Mr. Pinchot, Mr. Graves,, State Forester Griffith, of Wisconsin, and many other prominent foresters have given their unqualified approval to the bills as they stand.

Maryland

State Forester F. W. Besley and Assistant Forester Chapin Jones are holding a series of conferences with the forest wardens, forest partolmen, and lookout station men in the different counties in the western part of the State. There are between 15 and 20 men in each county engaged in the fire protection work. All-day conferences are held, in which the following program is to be carried out: 1, opening of the conference at 10 a. m.; 2, forest fire laws, their interpretation and enforcement; 3, causes of fires and the attitude of the people toward them; 4, equipment and preparation for fire fighting; 5, methods of fire fighting; 6, estimating fire damage; 7, use of the telephone; 8, forest wardens' reports; 9, appointment of deputies; 10, relation of wardens, patrolmen and lookout watchmen; 11, general discussion of other questions related to fire protection; 12, adjournment about 3.30 p. m.

It is believed that more satisfactory results may be accomplished by holding meetings in each county with an attendance of 15 or 20 men who are actually engaged in the fire protection work than to attempt a conference of all of the forest wardens of the State at one point, where there would be little opportunity of getting the views and expressions from individual members of the fire protection force. All of the forest wardens are residents of the districts in which their work is located; all own land of their own, so that their viewpoint is that of the forest owner as well as the man who is specially engaged in the work of forest fire protection.

The forester and assistant forester are also to hold a series of meetings, which began on March 25 and will continue until April 18. The program provides for an illustrated lecture each evening and conferences with woodland owners and examinations of woodlots during the day. The plan is to carry the subject of forestry to the people of the rural sections and to encourage the practice of forestry among woodland owners generally. This campaign of education is already bringing very encouraging results.

Oregon

Forestry work in Oregon was advanced to a marked degree by the recent legislative assembly. Appropriations for the State Board of Forestry were increased from $60,000 to $75,000 for the biennial period, thus making possible more extensive fire protection work, while also providing funds for the investigation of reforestation and woodlot management problems. The present forest law has greatly stimulated expenditures for forest protection by private timber land owners, and the legislature was therefore favorably inclined to provide sufficient funds to enforce it effectively.

Maine

Senator Charles E. Smith has introduced a bill in the Maine Legislature for the establishment of a State forestry nursery in connection with the Forestry Department at Augusta and the School of Forestry of the University of Maine. Senator Smith's plan is to supply forest tree seedlings suitable for planting on waste and cut over lands in Maine. These are to be sold at cost of production in order to encourage reforesting.

Up to the present time, with the exception of the educational work done by the University of Maine Forestry Department, forestry in this State has consisted solely of fire protection. It is now believed time to go a step further and keep pace with the general conservation movement of the country in order to preserve one of the greatest resources that the State has.

New York

The New York State Conservation Commission is making an appeal to all who go into the woods for business or pleasure to assist in preventing forest fires. The cooperation of the railroads of the State in the protection of forests and woodlands is being enlisted and the various companies are inserting in their vacation folders a page devoted to the welfare of the forests.

The statement is made that in New York State alone industries dependent upon wood manufacture products worth nearly $400,000,000 annually and employ 200,000 people. The sum of $20 is spent, largely in wages, on every thousand board feet of timber which is taken from the forest and when that amount of timber is destroyed by fire there is a loss to the community of far in excess of $20.

New Jersey

A sunken forest, entirely petrified, and thirty feet below the surface, was discovered recently near Bakersville, New Jersey. According to an estimate made by the State Geologist, the forest is at least 1,000 years old.

Workmen excavating for a clay mine kept striking hard substances after they had got down about thirty feet. They reported to Warren Somers, who owns the tract, and he submitted some of the substance to the State Geologist for analysis, received word that the stuff was petrified wood.

The forest covers an area of nearly 100 acres, and it is believed to date back to the Glacial Period, according to the geologist.

Massachusetts

The establishment of a forest preserve, involving possibly the reforestation of Cape Cod, is recommended by State Forester F. W. Rane in his report for 1912.

"I believe," he says, "it is time that we people of Massachusetts should take steps to secure a forest preserve, which might include, for example, the whole beautiful Berkshire county West of the Connecticut River, or our own renowned Cape Cod district. Either of these areas could readily be made into State reserves and exploited under modern ideas of forestry management similar to the methods now proposed in the Adirondacks.

"With a progressive policy a Berkshire forest reserve would ultimately outrival anything in Europe, as its location and topography are ideal.

"Although good old Cape Cod is a different forestry proposition altogether, nevertheless its thousands of acres of depleted and waste lands were once covered with magnificent forest growth, and I believe they could be returned through State management, at small expense, to a sylvan condition which would not only be a delight to the people of Massachusetts, but prove attractive to many from the other States who summer with us."

CURRENT LITERATURE

MONTHLY LIST FOR MARCH, 1913.

(Books and periodicals indexed in the Library of the United States Forest Service.)

Forestry as a Whole

Proceedings and reports of associations, state forest officers, etc.

California—State forester. Fourth biennial report. 148 p. il. Sacramento, 1912.

Canada — Dept. of the interior — Forestry branch. Report of the director of forestry for the year 1912. 269 p. il., map. Ottawa, 1913.

Holmes, J. S., comp. Proceedings of second annual convention of the North Carolina forestry association, held at Raleigh, N. C., Feb. 21, 1912; forest fires in North Carolina during 1911; suggested forestry legislation. 71 p. Raleigh, N. C., 1912. (North Carolina—Geological and economic survey. Economic paper no. 25.)

New South Wales—Dept. of Agriculture—Forestry dept. Report for the year ended 30th June, 1912. 20 p. il., maps. Sydney, 1912.

South Australia—Woods and forests department. Annual progress report upon state forest administration for the year 1911-12. 16 p. pl. Adelaide, 1912.

Wisconsin—State forester. Report for 1911 and 1912. 102 p. pl. Madison, 1913.

Forest Education

Forest schools

Biltmore forest school. Biltmore doings, 1909-1912. 172 p. pl. Biltmore, N. C., 1912.

New York state college of forestry, Syracuse university. Bulletin of state ranger school. 20 p. il. Syracuse, N. Y., 1913.

Forest Legislation

New York—Conservation commission. The conservation law of the state of New York. 167 p. Albany, N. Y., 1912.

Forest Botany

Société dendrologique de France. Bulletin no. 26. 90 p. il. Paris, 1912.

Silvics

Forest influences

Gifford, Walter M. Some observations on Hawaiian forests and forest cover in their relation to water supply. 24 p. Honolulu, Hawaiian sugar planters' association, 1913.

Forest experiment stations

Sweden — Forstliche versuchsanstalt. Mitteilungen, heft 9. 269 p. il., pl. Stockholm, 1912.

Silviculture

Planting

American forestry company. Little tree farms, South Framingham, Mass.; catalogue and price list, 1913. 23 p. Boston, Mass., 1913.

Berg, Fr. Graf von. Einige beobachtungen aus der baumzucht. 13 p. il. Bonn-Poppelsdorf, Deutsche dendrologische gesellschaft, 1912.

New York state college of forestry, Syracuse university. The reforestation of cut-over and idle lands in New York. 16 p. il. Syracuse, 1913.

Forest Protection

Insects

Burgess, A. F. The dispersion of the gipsy moth. 62 p. pl., maps. Wash., D. C., 1913. (U. S.—Dept. of agriculture—Bureau of entomology. Bulletin 119.)

Rohwer, S. A. Chalcidids injurious to forest-tree seeds. 7 p. Wash., D. C., 1913. (U. S.—Dept. of agriculture—Bureau of entomology. Technical series no. 20, pt. 6.)

Speare, A. T. & Colley, R. H. The artificial use of the brown-tail fungus in Massachusetts. 31 p. pl. Boston, State forester, 1912.

Fire

Washington forest fire association. Fifth annual report. 23 p. Seattle, 1912.

Forest Management

Forest finance

Poole, Clark L. & Co. Timber land bonds analyzed as investments for banks and trust companies. 80 p. il. Chicago, Ill., 1913.

Forest Economics

Taxation and tariff

Connecticut—Special commission on taxation of woodland. Report. 53 p. maps. Hartford, Conn., 1912.

Fairchild, Fred Rogers. Suggestions for a practical plan of forest taxation. 31 p. New Haven, Conn., 1912.

Forest Administration

National and state forests

Pennsylvania—Dept. of forestry. Forester's manual, pt. I: General instructions, outline for annual report, instructions upon forms. 30 p. Harrisburg, 1912.

United States—Dept. of agriculture—Office of the Solicitor. The national forest manual; general laws, parts of laws, decisions, and opinions applicable to the creation, administration, and protection of national forests, 97 p. Wash., D. C., 1913.

United States—Dept. of agriculture—Forest service. The national forest manual; water power, telephone, telegraph, power transmission lines. 63 p. Wash., D. C., 1913.

United States—Dept. of agriculture—Forest service. National forests; location, date, and area, Jan. 31, 1913. 7 p. il. Wash., D. C., 1913.

United States—Dept. of agriculture—Forest service. Review of Forest service investigations. v. 1. 8°. Wash., D. C., 1913.

United States—National forest reservation commission. Report, 1911-12. 16 p. Wash., D. C., 1912.

Forest Utilization

Lumber industry

Clyde iron works. Clyde self-propelling logging machinery. 91 p. il. Duluth, Minn., 1912.

United States—Department of commerce and labor—Bureau of corporations. The lumber industry; pt. 1: Standing timber. 301 p. map. Wash., D. C., 1913.

Wood-using industries

Pierson, Albert H. Wood-using industries of Connecticut. 96 p. tables. New Haven, Conn., 1913. (Connecticut agricultural experiment station. Bulletin 174.)

Auxiliary Subjects

Botany

Cook, O. F., and Doyle, C. B. Three new genera of stilt palms (Iriarteaceæ) from Colombia, with a synoptical review of the family. 14 p. pl. Wash., D. C., 1913. (Smithsonian institution—U. S. national museum. Contributions from the U. S. national herbarium, v. 16, pt. 6.)

Wooton, E. O., and Standley, Paul C. Descriptions of new plants preliminary to a report upon the flora of New Mexico. 88 p. pl. Wash., D. C., 1913. (Smithsonian institution—U. S. national museum. Contributions from U. S. national herbarium, v. 16, pt. 4.)

Conservation of resources

New York—Conservation commission. First annual report, 1911, vol. 2: Division of inland waters. 325 p. pl., maps. Albany, N. Y., 1912.

National parks

American civic association — Dept. of national and state parks. National parks. 30 p. Wash., D. C., 1913.

Clearing of land

Clyde iron works. Cutting the cost of clearing logged-off lands. 24 p. il. Duluth, Minn., 1912.

Periodical Articles

Miscellaneous periodicals

American botanist, Feb. 1913.—In the home of the fan palm, by Charles Francis Saunders, p. 1-5.

Annals of botany, Jan. 1913.—The morphology of Agathis australis, by Arthur J. Eames, p. 1-38.

Breeder's gazette, Feb. 12, 1913.—Handling evergreens, by A. T. Erwin, p. 398.

Country gentleman, Jan. 4, 1913.—How to use pine needles, p. 26.

Country life in America, March 1913.—The fascinating art of making vistas, by Wilhelm Miller, p. 35-8; Planting trees as an old-age investment, by Stanley Johnson, p. 90-2; Landscape forestry on the Bayard Thayer place, by Arthur G. Eldredge, p. 126-30.

Muhlenbergia, Dec. 1912.—Coreopsis gigantea, by S. B. Parish, p. 133-4.

Nature-study review, Feb. 1913.—Tree study in primary grades, by Edith R. Mosher, p. 54-60.

New phytologist, Jan. 1913.—Some observations on wound healing in a species of oak, by A. V. Duthie, p. 7-12.

Review of reviews, Feb. 1913.—Trees instead of grain; the agriculture of the future, p. 219-20.

Saturday evening post, March 1, 1913.—Uncle Sam's woodlot, by Gifford Pinchot, p. 8-9, 69-70.

Scientific American supplement, Feb. 8, 1913.—Our national forests; their value, management and needs, p. 90-1.

Sierra club bulletin, Jan. 1913.—A lightning-struck tree in Kern cañon, by Willis Linn Jepson, p. 25-7; National parks, the need of the future, by James Bryce, p. 28-32.

Trade journals and consular reports

American lumberman, Feb. 15, 1913.—Timber taxation, p. 49; Logging operations in the Philippines, p. 52-3; What forest protection needs most, p. 53; Forest resources of South America, p. 58; Afforestation in Korea, p. 77.

American lumberman, Feb. 22, 1913.—Foresters discuss phases of government work, p. 45; Getting logs to the rail side, p. 59.

American lumberman, March 1, 1913.—Wire rope as a factor in modern lumbering, p. 40; Wood-block paving specifications amended, p. 41.

American lumberman, March 8, 1913.—Forest conservation and problems of timber and lumbering, by J. B. White, p. 38; Creating profit from waste, p. 43-51; Log yards, p. 57.

Barrel and box, Feb. 1913.—Beech for slack cooperage stock, p. 35.

Canada lumberman, March 1, 1913.—Forestry developments of past year, p. 42-3.

Hardwood record, Feb. 25, 1913.—Hardwoods of the Pacific slope, p. 20-1; The truth about catalpa, p. 24; In the lair of the eucalypts, p. 27-8; Kraetzer-cured lumber, p. 30-1; German East African cedar, p. 31; An analysis of wood values, p. 33-5.

Hardwood record, March 10, 1913.—White cedar from British Guiana, p. 21; Woods used for walking sticks, p. 23-4; Ebonies of commerce, p. 26; One source of flagrant waste, p. 27-8.

Lumber trade journal, March 1, 1913.—Logging by pull boat, p. 22-3.

Lumber world review, Feb. 25, 1913.—The double use of cypress timbers, p. 26.

Municipal journal and engineer, March 6, 1913.—Laying wood block pavements, p. 355.

Pacific lumber trade journal, Jan. 1913.—The Pacific log rule, p. 125. Pacific lumber trade journal, Feb. 1913.—Twelve reasons for wood paving, by Robert Fullerton, p. 40, 44.

Paper, Feb. 26, 1913.—Notes on the chemistry of papermaking, by Thomas J. Keenan, p. 27-30; Progress of papermaking in 1912, by Arthur D. Little, p. 35-7; Paper and pulp development in Canada, by Ellwood Wilson, p. 60, 64, 66, 68, 70, 72; The future of chemical pulp, by Thomas Hunter, p. 84-6.

Paper trade journal, Feb. 13, 1913.—Growing of wood crops, by Theodore F. Borst, p. 56.

Paper trade journal, Feb. 20, 1913.—A review of the paper trade, 1912; résumé of conditions in the United States, Canada, Great Britain, Norway, Sweden and Germany, p. 5-173; Development of the Connecticut river, by Arthur C. Merritt, p. 175-183; Baobab bark for papermaking, p. 183; Forestry camp of New Brunswick university, by R. B. Miller, p. 185-9; Elimination of waste in logging, by D. E. Lauderburn, p. 189-99; Forest resources of Labrador peninsula, by Julian E. Rothery, p. 199-205; Cost and efficiency of production of pulp and news

print paper, by Ethelbert Stewart, p. 215-23; Raising a timber crop in New England, by Samuel J. Record, p. 223-29; Nine million dollars for moisture, by C. J. Blanchard, p. 231-7; Palmyra palm leaves as a paper substitute, p. 237-9; A new source of pulp supply, by Frederick Finch Strong, p. 313-15.

Pioneer western lumberman, March 1, 1913.—The lumberman and the law, by C. S. Chapman, p. 13-15; Improvements in telephone apparatus for use in the woods, by Carl Bush, p. 15-17.

Pulp and paper magazine, Feb. 15, 1913.—The manufacture of strawboard and strawpaper, by Leo Schlick, p. 123-5.

Southern lumber journal, Feb. 15, 1913.—A bill to be entitled an act to protect the forests of the state from fire, p. 44; Inspection rules for the classification and inspection of North Carolina pine, p. 48-9.

St. Louis lumberman, March 1, 1913.—Log scaling today and yesterday, p. 57-8; Wood block paving in the south, p. 69.

Southern lumberman, Feb. 15, 1913.—Utilization of yellow pine waste on a commercial basis, by H. S. Sackett, p. 30-1.

Southern lumberman, Feb. 22, 1913.—The available standing timber; a national resource that is fast disappearing, by B. B. W., p. 27.

Timber trade journal, Feb. 8, 1913.—The Finnish state forestry department mills, p. 193-4.

Timber trade journal, Feb. 22, 1913.—Argentine timber and pulp-wood, p. 276.

Timberman, Feb. 1913.—Creosoted wood block pavement, by R. M. Fullerton, p. 38-42.

United States daily consular report, Feb. 19, 1913.—Shuttle supplies for England, by Augustus E. Ingram, p. 911.

United States daily consular report, March 7, 1913.—Timber in Persia, p. 1145.

West Coast lumberman, Feb. 1913.—Box woods of the northwest, p. 269-70.

Wood craft, March 1913.—New system of wood preservation, p. 167; Bedroom furniture in design and construction, by John Bovingdon, p. 168-72; Utilization of sawdust for cleaning purposes, p. 174; Brazilian timber and its value for wood working, p. 176; Uses of sawdust, p. 183; African mahoganies and the related woods, p. 184-5.

Forest journals

Allgemeine forst- und jagd-zeitung, Dec. 1912.—Die anwendung der bodenreinertragslehre in den deutschen staatsforsten, by Heinrich Martin, p. 403-10.

Allgemeine forst- und jagd-zeitung, Jan. 1913.—Vergleichende gegenüberstellung der für Bayern, Württemberg, Baden und Hessen neuzeitung erlassenen vorschriften für die ausarbeitung von betriebseinrichtungen, by Thaler, p. 1-125.

Boletin de bosques, pesca i caza, Jan. 1913.—Los perjuicios causados al pais con la destruccion de los bosques, by Federico Albert, p. 435-44; El verdadero pino Oregon, by Federico Albert, p. 444-61.

Bulletin de la Société centrale forestière de Belgique, Feb. 1913.—Effets de la sécheresse, p. 65-74; L'epicéa de Sitka, by G. Delevoy, p. 74-84; Incendies dans les bois, p. 87-96.

Centralblatt für das gesamte forstwesen, Dec. 1912.—Die kreisflächenkluppe, by Hans Tropper, p. 541-54; Ergebnisse und probleme auf dem gebiette der nonnenforschung in Oesterreich, by Walther Sedlaczek, p. 554-67.

Centralblatt für das gesamte forstwesen, Jan. 1913.—Zur praxis der waldwertsberechnung, by Theodore Glaser, p. 1-11; Kritische betrachtungen über einige broschüren betreffend künstliche düngung im forstlichen betriebe, p. 11-18; Infektionsversuche mit nonneneiern, by J. Neves, p. 18-25.

Forest leaves, Feb. 1913.—Proposed forestry taxation legislation, p. 2-5; Prunus serotina; wild cherry, wild black cherry, rum cherry, by J. T. Rothrock, p. 8.

Indian forest records, 1912.—Note on the distillation and composition of turpentine oil from the chir resin and the clarification of Indian rosin, by Puran Singh, p. 1-89.

North Woods, Feb. 1913.—Passing of the lumberjack, p. 4-5.

Revue des eaux et forêts, Jan. 15, 1913.—La question de la Forêt d'Eu, by J. Demorlaine, p. 33-9.

Revue des eaux et forêts, Feb. 1, 1913.—L'École royale forestière, by R. V., p. 65-71; Conifères; essais de tableaux dichotomiques pour la détermination des espèces, by L. Pardé, p. 77-8.

Schweiserische zeitschrift für forstwesen, Dec. 1912.—Der riesweg am Stanserhorn, by F. Fankhauser, p. 371-4; Die eiben in der Höcklerwaldung bei Zürich, by Gottl. Kramer, p. 374-7; Ein bergahorn mit russiger borke, by F. Fankhauser, p. 378-80.

Schweiserische zeitschrift für forstwesen, Jan. 1913.—Die heutigen grundsatze und ziele des waldbaues, by A. Engler, p. 2-10; Die verbauung am Krauchbach in Matt, by W. Oertli, p. 10-14; Gipfelbrüche der fichte infolge zapfenreichtums, by F. Fankhauser, p. 19-21; Ein typisches beispiel der parzellierung des privatwaldes, by M. Decoppet, p. 22-3.

Tharandter forstliches jahrbuch, 1913.—Die mathematik im dienste der forst wirtschaft, by Fr. Jentsch, p. 27-34; Zur anwendung der ausgleichsrechnung bei der beurteilung forstlicher versuchsergebnisse, by Hugershoff, p. 35-47; Fortschritte der leimtechnik, by K. Escherich, p. 78-88.

Zeitschrift für forst- und jagdwesen, Jan. 1913.—Stiel- und traubeneichel, by J. Oelkers, p. 18-45; Bekämpfung der nonne durch leimringe, p. 48-51.